PRELIMINARY FINDING OF NO SIGNIFICANT IMPACT
TEMPORARY DEVIATION TO THE REGULATION SCHEDULE
FOR LAKE ISTOKPOGA

The proposed action analyzed in this Environmental Assessment (EA) is recommendation of a temporary deviation from the existing approved Regulation Schedule for Lake Istokpoga to lower Zone B of the Regulation Schedule from 37.0 feet, NGVD to 36.0 feet, NGVD. I have reviewed the information analyzed in the Environmental Assessment for the proposed action, reflecting pertinent information obtained from other agencies having jurisdiction by law and/or special expertise. I conclude that there would be no significant adverse impacts caused by the proposed temporary deviation, taking into consideration the adverse effects of the severe drought itself. Summary reasons for this conclusion are that the proposed action:

a. Is a short-term temporary deviation from the established Regulation Schedule for Lake Istokpoga to aid in providing needed water supply for agricultural users in the Indian Prairie Region and the Seminole Brighton Tribe during the regional drought occurring in Florida.
b. Will not adversely affect the balance of authorized purposes of the Central and Southern Florida Project for flood control, water supply, fish and wildlife conservation, and recreation.
c. Will not permanently affect wildlife or fish or their habitats in Lake Istokpoga.
d. Has been the subject of consultation which resulted in a Biological Opinion and authorization for incidental take, pursuant to the Endangered Species Act for snail kite nests on Lake Istokpoga.

Based on the information summarized, and after consideration of public and agency comments received on the project, I find that the proposed action will not have a significant effect on the quality of human environment under the meaning of Section 102(2)(C) of the National Environmental Policy Act, and, therefore, does not require preparation of an Environmental Impact Statement.

_____ _____

Paul L. Grosskruger
Colonel, U.S. Army
District Commander

Date

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ENVIRONMENTAL ASSESSMENT

Temporary Deviation to the Regulation Schedule for Lake Istokpoga
for 2007-2008 Drought Relief

1.0 Background

1.1 Introduction

In June 2007, the Corps approved a temporary deviation to Lake Istokpoga's regulation schedule to lower Zone B of the Regulation Schedule from 37.0 feet, NGVD to 36.5 feet, NGVD in order to provide water to users in the Indian Prairie Region in anticipation of future drought conditions associated with the regional drought. The deviation would have allowed for an additional 0.5 ft of water to be used for water supply to users in the basin. Because of actual rainfall received in the basin, regional water conservation measures and water shortage planning efforts, the SFWMD did not implement the deviation.

Because of low summer rainfall, the continuation of low lake stages, and anticipated even lower water levels in 2008, the SFWMD has requested that the Corps approve a deviation from the Lake Istokpoga regulation schedule to 35.5 ft, NGVD in order to provide water to users in the basin through 15 October 2008. See Appendix A for official copy of request and appendix C for the Environmental Assessment that was prepared in June 2007.

1.2 Authority

Lake Istokpoga is part of the Central and Southern Florida Project (C&SF Project), as described in House Document 643, which Congress authorized as the C&SF Project in the 1954 Flood Control Act (Pub. L. No. 83-780). The purposes of the C&SF Project include flood control, water supply, navigation, recreation, and preservation of fish and wildlife. Section 309 of the 1992 Water Resources Development Act directed the Corps to determine "whether modifications to the existing project are advisable at the present time due to significantly changed physical, biological, demographic, or economic conditions" and allows for reevaluation of the project.

Corps Regulation, 33 CFR 222.5, Water Control Management (ER 1110-2-240), further provides that the Chief of Engineers or his designated representative may authorize or direct deviation from the established water control plan (regulation schedule) when conditions warrant such deviation.

1.3 Purpose and Need

The purpose of the deviation is to lower Zone B of the Regulation Schedule for Lake Istokpoga for potential water supply as necessary for agricultural use by the Indian Prairie Region and the Seminole Indian Brighton Reservation. Currently releases from

Lake Istokpoga are not being made to the Indian Prairie Region, and users are at 100% cutbacks. This deviation, if approved, would supply much needed water to users in the region.

1.4 Decisions To Be Made

The Corps, SAJ, must take no action or an alternative action (temporary deviation) and the Corps South Atlantic Division (SAD) must approve the preferred alternative, approve another alternative, or decide to maintain the existing approved Regulation Schedule. The Corps, SAJ can recommend any alternative or modified alternative. Even if the proposed deviation is approved, the SFWMD is under no obligation to utilize it.

2.0 Alternatives and Proposed Action

Based on available information, and the current situation in Lake Istokpoga, there are 3 alternatives that will be considered:

Alternative 0 – Current Regulation schedule – 37.0 ft, NGVD
Alternative 1 – Lowering Lake Istokpoga to 35.5 ft, NGVD
Alternative 2 – Lowering Lake Istokpoga to 36.0 ft, NGVD

Figures 1-3 are the Lake Istokpoga Regulation Schedules displaying the alternatives.

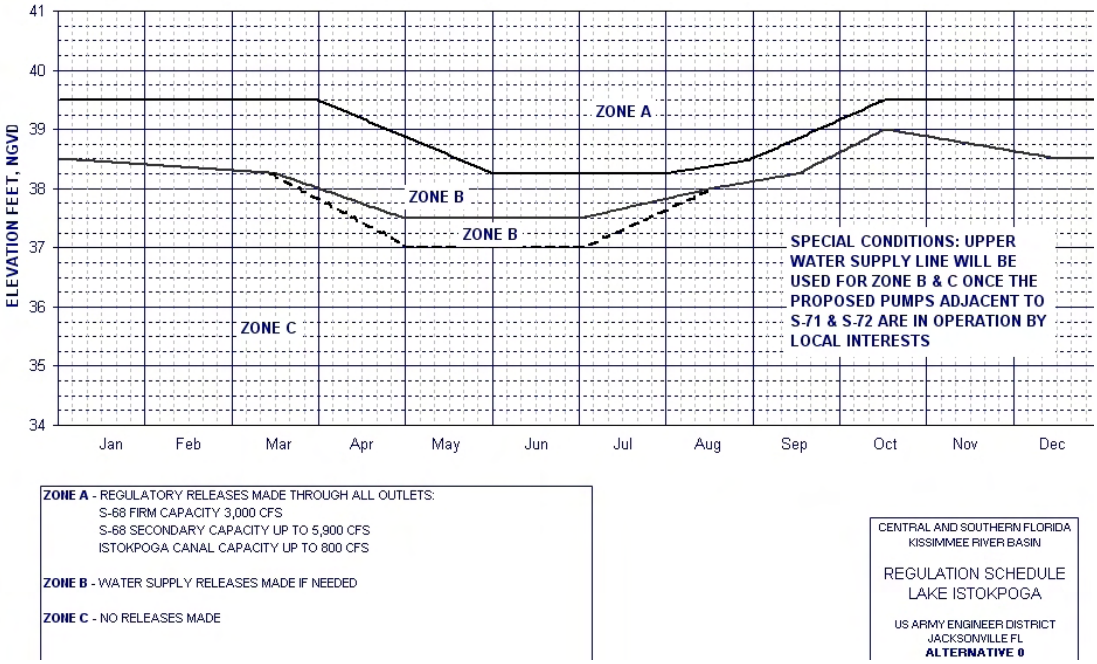

Figure 1 – Alternative 0, No Action Alternative

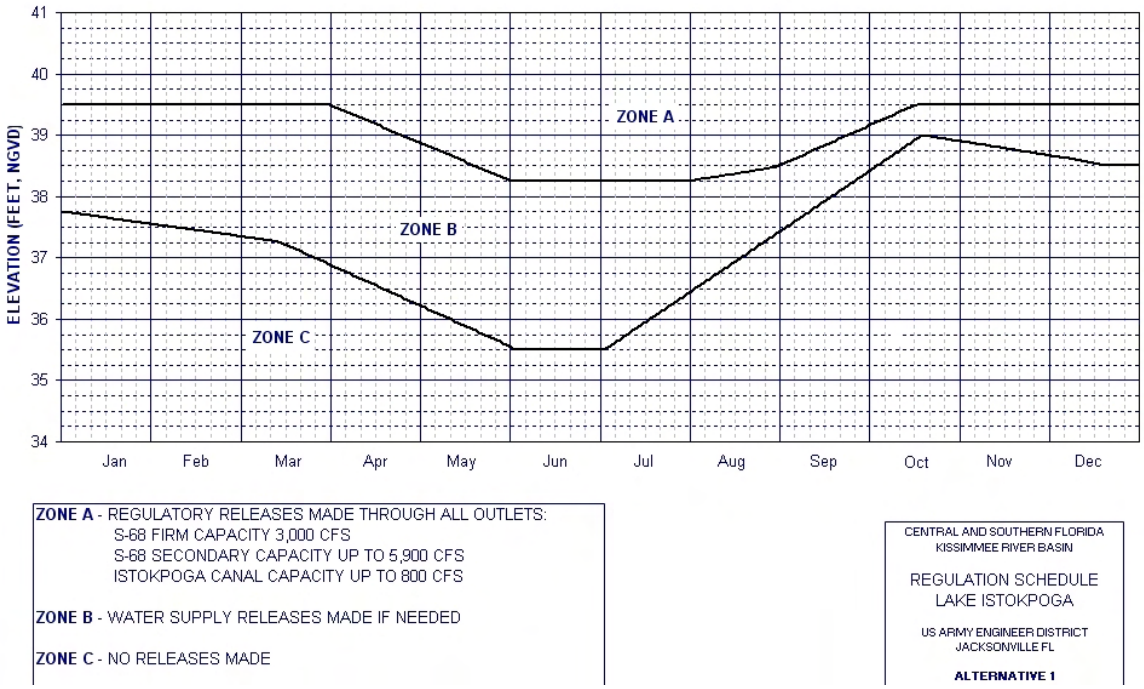

Figure 2 – Alternative 1, SFWMD's Request

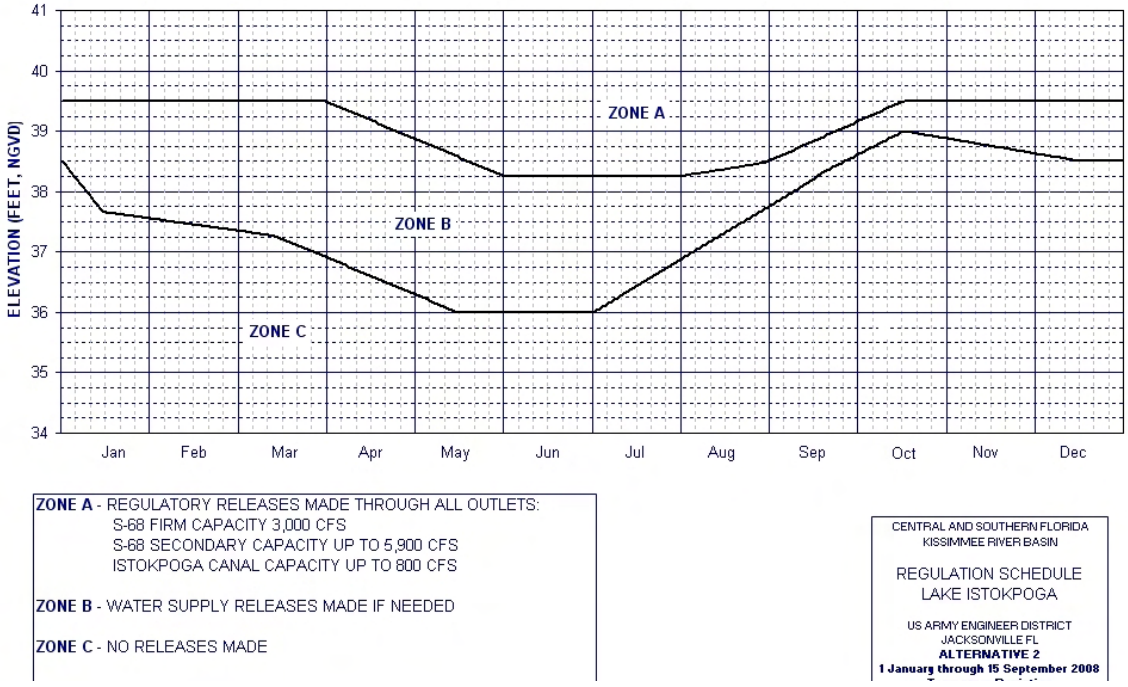

Figure 3 – Alternative 2, Preferred Alternative

3.0 Existing Conditions

A concise overview of existing conditions and updated information will be presented in this EA. See Appendix C and the EA completed in June 2007 for more extensive existing conditions of Lake Istokpoga including hydrology, previous deviations, environmental resources, hydrilla, water shortage restriction orders, endangered species, socio-economics, and recreation.

3.3.1 General Conditions

Lake Istokpoga is currently at 38.47 ft, NGVD (Dec 20, 2007). Lake Okeechobee is currently at 10.27 ft, NGVD. Daily lake level records continue to be set for low water levels on Lake Okeechobee, as below average rainfall continues in the basin. When the elevation in Lake Okeechobee reaches 10.5 ft, NGVD or below, use of the G-207 & G-208 pump stations, which are used to provide water supply to the lower portion of the Indian Prairie Basin, are limited due to operational concerns. The result is that there have been no releases made for agriculture users in the Indian Prairie Region, resulting in 100% cutbacks to these users. Figure 4 depicts water levels on Lake Istokpoga to date.

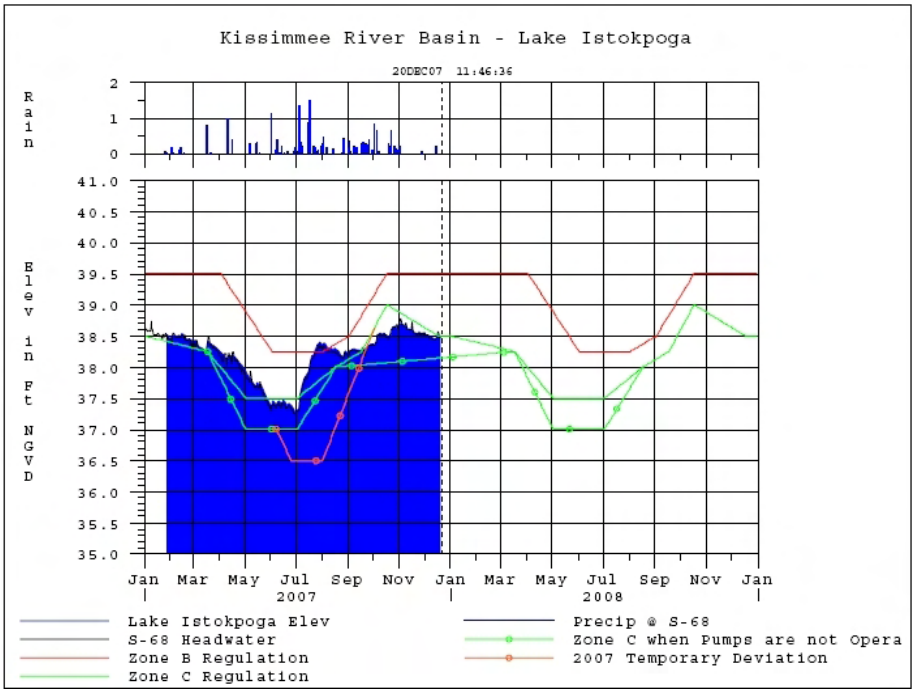

Figure 4 – Water Levels on Lake Istokpoga

3.3.2 Ecological Resources

Lake Istokpoga water levels have remained lower than usual as a result of the regional drought. Lower water levels increase the area in which seeds of emergent plants can germinate (SFWMD, 2007). Lower water levels also allow more light to reach the bottom of the lake, which promotes the growth of native submergent vegetation such as

Illinois pondweed (*Potamogeton illinoesis*) and eelgrass (*Vallisneria americana*). Following the 2001 drawdown, the coverage of Illinois pondweed and eelgrass increased to several hundred acres north of Bumblebee Islands and Big Island. Because Lake Istokpoga is consistently treated for hydrilla, this is a concern of the drawdown. Currently hydrilla coverage on the lake is low, but artificial drawdowns significantly increase sprouting rates of tubers at a rate of 75-95% after the site is inundated (Haller et al, 1976). Because there are limited options for hydrilla treatment, the potential for stimulating growth is a serious risk of exposing large areas of tubers.

3.3.3 Endangered Species

Federally listed species that may occur in or around Lake Istokpoga include the Everglade snail kite, wood stork, and Audubon's crested caracara. In relation to the temporary deviation however, potential impacts would only affect the snail kite. Lake Istokpoga is used as foraging and reproductive habitat for the snail kite. Snail kites nest through spring and early summer, and nests could be adversely impacted by the lowering of water levels. Florida apple snails are the primary food source for the snail kite and abundance of this food source affects nesting success of snail kites. Apple snails can not tolerate extended periods of dessication and extended periods of low water levels (whether drought induced or temporary deviations) can have severe impacts on apple snail populations.

Consultation was initiated with the U.S. Fish and Wildlife Service on October 31, 2007 for the Everglade snail kite. The Corps coordinated a "may affect" determination and requested an incidental take statement for snail kite nests that could be affected if Lake Istokpoga water levels were lowered. Coordination was concluded late December 2007. USFWS provided a Biological Opinion including an incidental take statement with the requirement that artificial nest supports be implemented on these nests prior to lowering of the water levels.

4.0 Effects

The drought itself has already caused adverse effects on natural plant communities, fish and wildlife all over Florida. Implementation of the temporary deviation from the Regulation schedule is anticipated to intensify the adverse effects of the drought. The severity of the temporary deviation implementation effects will depend not only on how low the water levels get, but the duration of the water levels. This Environmental Assessment was prepared in November 2007, with the onset of the dry season. The adverse effects of the deviation in combination with the uncertainty of when this drought may break leave it difficult to assess impacts. If indeed the drought continues into the next wet season, severe impacts would continue to occur in the region regardless of whether the temporary deviation is implemented or not.

During the weekly teleconferences that were held during the planning phase of this proposed temporary deviation, USFWS stated that they had serious concerns about lowering the water levels on Lake Istokpoga to 35.5 ft, NGVD, as requested by SFWMD. The littoral zone area that would be exposed and dried out if Lake Istokpoga were

lowered to 35.5 ft, NGVD could cause serious impacts to apple snails not only for this season, but for the next several years. These impacts to apple snails are directly linked to impacts to the snail kites on Lake Istokpoga. The 36.0 ft, NGVD alternative was developed in order to balance ecological needs with water supply needs in the best manner possible in the current drought situation.

4.1 Environmental Effects

4.1.1 General

Several comments received from the public involved hydrilla expansion in the lake as a result of the low water levels. Jeff Schardt (DEP) provided comments on the proposed deviation as well as valuable information and possible impacts that may occur with certain water levels. In his response, Jeff stated that "DEP has contractors and funding in place to react to the extent possible to aquatic plant issues that may develop on Lake Istokpoga". The following information relating to hydrilla and Lake Istokpoga was provided by Jeff Schardt. Lake Istokpoga has a 30-year history with the invasive submersed plant hydrilla, which has covered as much as 25,000 acres of the surface of this nearly 28,000-acre reservoir. The DEP is in the process of mapping the current hydrilla standing crop on the lake, but generally, hydrilla is much reduced, found mostly in the south and southeast part of the lake and around the islands. However, tubers may still be present throughout most of the lake. The current hydrilla standing crop is low probably due to several factors. Large-scale herbicide treatments in 2004 were followed by an active hurricane season in 2004 along with many storms with extended high wind periods in 2005. These storms not only uprooted hydrilla, but likely suppressed hydrilla regrowth from tubers via increased tannin and turbidity levels limiting light penetration in the water column.

Keeping hydrilla under low levels of control is extremely important in Lake Istokpoga. If hydrilla again covers the surface across thousands of contiguous acres, regaining control may be extremely difficult. Hydrilla in Lake Istokpoga is becoming increasingly resistant to fluridone herbicide; the systemic herbicide that was used for about for large-scale hydrilla control in the lake. Increasing resistance is not the only difficulty in using fluridone in Lake Istokpoga. In order for fluridone to be effective, it must be sustained in the water column at a sufficient concentration for about 90-120 days. Fluridone is broken down via photolysis and microbial degradation and generally has a half life in Florida waters of about 30-35 days. However, the past two large-scale fluridone applications in Lake Istokpoga have been terminated because of a half life of only about seven days due to enhanced microbial degradation activity. DEP was unable to sustain an appropriate level of fluridone in the water column to control hydrilla.

Since increased fluridone resistance was first confirmed in Florida in 2000, the DEP has been working with researchers and managers across the nation to develop new hydrilla management tools and strategies. A systemic compound, penoxsulam, has been registered by USEPA and the FL Department of Agriculture and Consumer Services for large-scale hydrilla control in Florida waters, but it does not have crop tolerance approval from USEPA. Since a major use of Lake Istokpoga water is for crop irrigation, and since the

temporary deviation request is to supply a source of irrigation water, Lake Istokpoga does not appear to be an appropriate venue to apply a registered compound that does not yet have crop tolerance approval. Therefore, DEP has been focusing on suppressing regrowth of hydrilla through frequent applications of contact-type herbicides already registered for Florida use (Jeff Schardt, DEP).

After the drought ends and water levels return to within schedule there will be residual impacts to wildlife and habitats. In areas where there are few or no refugia, or where conditions become extremely dry, entire aquatic fauna populations may be lost. Small fish such as mosquitofish may recover within one year, while others may take 3-5 years or longer. The result is lower productivity (food for higher trophic levels) and potentially impacted recreational fisheries. Lower productivity can also affect wading birds in future years.

4.1.2 Endangered Species Effects

Although there are three Federally listed species located within the project area (Everglade snail kite, wood stork, and Audubon's crested caracara), impacts as a result of the temporary deviation would be limited to the snail kite.

Snail kites nest over water, in shrubs & trees or in marsh vegetation less than 2 meters in height (typically spike rush (*Eleocharis cellulose*), maidencane (*Panicum hemitomon*), sawgrass (*Cladium jamaicense*), bulrush (*Scirpus* spp.), and/or cattails (*Typha* spp.)). During drought years or when the water levels decrease, these types of herbaceous vegetation lose their structure and could cause the nest to collapse. Lowering the water level significantly beneath the nest can also leave the nest vulnerable to predators. When water levels drop, the number of apple snails near the nest may also be reduced by drying, forcing the adult to fly further to feed the chicks and leaving the juvenile kites with less food base nearby.

Other effects on the snail kite would be secondary impacts as a result of impacts to their food base (apple snails). The rapidly receding water levels coincide with breeding season of the apple snail (April-June) and could result in decrease numbers of apple snails this year. Apple snails generally only live 12-18 months, and a reduction in this years breeding would significantly impact apple snail abundance next year.

Formal Consultation on the snail kite was completed late December, 2007, and an incidental take was authorized for harm or death of up to eight snail kite eggs or chicks for the 2008 nesting season. No mortality of adult kites is anticipated and artificial nest supports are required for the existing nests on the lake as an attempt to prevent collapsing. As stated above, lowering the water levels on Lake Istokpoga to 35.5 ft, NGVD (alt 1) as requested by SFWMD, was strongly opposed by USFWS. The littoral zone area that would be exposed and dried out if Lake Istokpoga were lowered to 35.5 ft, NGVD could cause serious impacts to apple snails not only for this season, but for the next several years. These impacts to apple snails are directly linked to impacts to the snail kites on Lake Istokpoga. The 36.0 ft, NGVD alternative (alt 2) was developed in

order to balance ecological needs with water supply needs in the best manner possible in the current drought situation. The Biological Opinion is included in appendix B of this report.

5.0 Public Coordination

Weekly teleconferences have been held since early November 2007 with discussions involving the proposed temporary deviation for Lake Istokpoga. Agencies represented at these teleconferences include Florida Fish and Wildlife Conservation Commission, Highlands County, U.S. Fish and Wildlife Service, South Florida Water Management District, and the U.S. Army Corps of Engineers. The purpose of these weekly meetings is to ensure issues are identified early in the process so that solutions can be discussed in a open forum.

Staff from the Corps and the SFWMD attended the Highlands County Commissioners Meeting on November 12, 2007 and a joint presentation was given by Kim O'Dell (SFWMD)and Catherine Byrd (Corps) outlining the deviation request by the SFWMD and current conditions in the basin. Members of the public were present and comments were solicited. Many people present at the meeting stated that the concerns had not changed and were the same as the concerns that were presented in May of 2007 for the last deviation.

David Douglass, SOS Florida Lakes, stated his concern was that we were doing another deviation so soon after the last one. What will happen if the drought continues? At what point will the deviations stop? He also asked if other alternative means of providing water were considered, such as transferring water to Lake Istokpoga from the Kissimmee River via the Istokpoga Canal.

Bill Dwinnell, Friends of Lake Istokpoga, Concerned about repetitive deviations and thought that Lake Istokpoga is suffering more than some other areas. He (and other members of the Friends of Lake Istokpoga) is also concerned with the possibility of hydrilla expansion and what treatments would be available to control hydrilla due to the deviation.

Ray Royce, Heartland Agriculture Coalition, stated that he endorsed the deviation and requested that the Corps consider impacts to agriculture users that will occur if the deviation is not granted.

Commissioner Stokes voiced concerns about tribal rights to water. SFWMD provided answers concerning allocations to the Brighton Seminole tribe.

The Board of Commissioners stated that they have no position on the requested deviation, but request that the Corps carefully consider all impacts before making a decision. The Commissioners thank us for presenting the information and allowing the opportunity for concerns to be voiced.

Previous scoping letters and concerns are outlined in Section 5 of the June 2007 EA which can be found in Appendix C.

6.0 The Recommended Action

The Jacksonville District, U.S. Army Corps of Engineers has considered the temporary deviation request received from the South Florida Water Management District on October 31, 2007. The Corps does not recommend the deviation as requested (to 35.5 ft, NGVD), but does recommend approval of a deviation which would allow the Lake Istokpoga water level to go to elevation 36.0 ft, NGVD (alternative 2) while there are releases for water supply. The recommended temporary deviation to the Lake Istokpoga Regulation Schedule includes the lowering of Zone B from 37.0 to 36.0 ft, NGVD beginning with the approval of this action and extending through 30 June 2008. If there is sufficient rainfall to meet water supply needs in the basin, the deviation does not have to be implemented. The refill period will begin on 1 July 2008 as shown in Figure 5. The Corps recommends that water conservation measures be continued for the duration of the temporary deviation and drought emergency.

Reasons for recommending alternative 2 as opposed to the request as received by the SFWMD are largely based on ecological impacts that could result from lowering Lake Istokpoga to 35.5 ft, NGVD. The Corps believes that the additional water that would be supplied under Alternative 1 would inflict more adverse effects on plant communities, and habitat and forage species for wildlife, including listed endangered species in Lake Istokpoga. Approving a deviation to 35.5 ft., NGVD would set a precedent and ecological impacts that could result are unknown. A temporary deviation of this magnitude would likely result in a lake level of significantly less than 35.5 ft., NGVD due to evaporation and transpiration if drought conditions continue in the region.

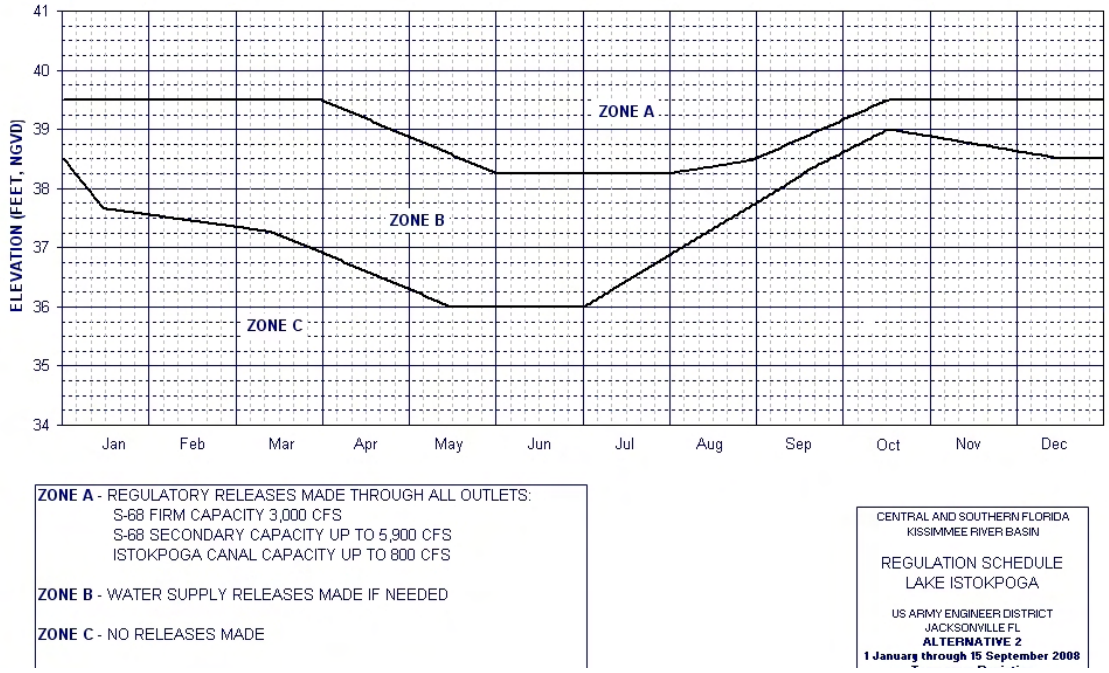

Figure 5 – Regulation Schedule for Recommended Alternative

7.0 Compliance of the Proposed Action with Environmental Law, Regulations and Policies

This Environmental Assessment was prepared by Catherine Byrd, Biologist, Planning Division, with assistance from the following individuals:

Luis Alejandro	Hydraulic Engineer	USACE
David Anderson	Sr. Environmental Scientist	SFWMD
Barbara Cintron	Chief, South Florida Section	USACE
Trent Ferguson	Hydraulic Engineer	USACE
Tom Kosier	Chief Environmental Scientist	SFWMD
Kim O'Dell	Sr. Environmental Scientist	SFWMD
John Zediak	Chief, Water Management Section	USACE

7.1 National Environmental Policy Act of 1969, as amended. Environmental information on the project has been compiled and an Environmental Assessment, dated Dec 2007, has been prepared. The project is in compliance with the National Environmental Policy Act.

7.2 Endangered Species Act of 1973, as amended. Endangered Species Consultation with USFWS was completed for the snail kite. Consultation was initiated in Nov 2007 and completed in Dec 2007. This project is in full compliance with the Act.

7.3 Fish and Wildlife Coordination Act of 1958, as amended. There are no structural changes for this temporary deviation. This project is in full compliance with this Act.

7.4 National Historic Preservation Act of 1966, (PL 89-665), the Archeological and Historic Preservation Act (PL 93-291), and Executive Order 11593. Temporary deviation to lower the floor of Zone B will have no effect on historical resources, therefore this action is in compliance with this act.

7.5 Clean Water Act of 1972, as amended. There are no structural changes or diversion of water as part of this temporary deviation. This project is in full compliance with this act.

7.6 Coastal Zone Management Act of 1972, as amended. State consistency review was performed during the scoping phase of this project and the State has determined that the project is consistent with the Florida Coastal Zone Management Program.

7.7 Farmland Protection Policy Act of 1981. No prime or unique farmland would be impacted by implementation of this project. This act is not applicable.

7.8 Marine Mammal Protection Act of 1972, as amended. Marine mammals would not be affected by this action, therefore, this Act is not applicable.

7.9 E.O. 11990, Protection of Wetlands. No wetlands would be permanently impacted by this action. This project is in compliance with the goals of this Executive Order.

References:

Anderson, David. 2007. Assessment of Ecological Impacts on Lake Istokpoga of a Proposed Deviation to the Regulation Schedule. South Florida Water Management District, West Palm Beach, FL

Audubon of Florida. 2005. Appendix B: Management Needs of the Kissimmee Chain of Lakes and Lake Istokpoga. In Lake Okeechobee: A synthesis of information and recommendations for its restoration. Miami, FL

Haller, W.T., J.L. Miller, and L.A. Garrrard. 1976. Seasonal production and germination of hydrilla vegetative propagules. Jornal of Aquatic Plant Management. 14:26-29.

U.S. Fish and Wildlife Service (2007). Biological Opinion for Lake Istokpoga Regulation Schedule Temporary Deviation Request. Vero Beach, FL

UPDATED ASSESSMENT OF ECOLOGICAL IMPACTS ON LAKE ISTOKPOGA OF A PROPOSED EXTENSION OF THE DEVIATION TO THE REGULATION SCHEDULE

Prepared By David Anderson, Kissimmee Division, Watershed Management Department, South Florida Water Management District
October 26, 2007

INTRODUCTION

This report evaluates the potential impacts on Lake Istokpoga of a proposed deviation to the regulation schedule for S-68, the principal outlet from the lake. This deviation is being requested to meet the water supply needs of downstream users (primarily agriculture) in the Lake Istokpoga/Indian Prairie Basin. In the spring of 2007, the District made a similar request that would have allowed the water level in Lake Istokpoga to be lowered to 36.5 ft (all water level elevations are NGVD). Because of rainfall and the District's water shortage restrictions, the Temporary Deviation to the Lake Istokpoga regulation schedule was not utilized. Water supply conditions have worsened in the area supplied by Lake Istokpoga. The current request for a deviation would allow releases to meet water supply demands until the water level in the lake dropped to 35.5 ft. This report updates the ecological assessment prepared for the previous deviation request. The evaluation of ecological impacts considers the context of current conditions and the characteristics of the deviation request. The objectives of this report are to 1) summarize current conditions in the basin, 2) describe the proposed deviations to the regulation schedule, and 3) conduct analyses of potential ecological effects likely to result if the proposed deviation is implemented.

CURRENT HYDROLOGIC CONDITIONS

Water levels in Lake Istokpoga depend on rainfall and inflows from the 607 square mile (388,480 acres) basin, including groundwater and two streams, Josephine Creek and Arbuckle Creek. Currently, inflows are small. On October 22, the U. S. Geological Survey's web-site for real-time water data reported flows of 102 cfs in Arbuckle Creek (station 02270500) and 37 cfs for Josephine Creek (station 02271500). Monthly rainfall was below average for most of 2006 (Figure 1) resulting in a total for the year of 33.45 inches, which is 12.18 inches below (or 73% of) the 30-year average. For most months in 2007, rainfall has continued to be below average. However, April and September had approximately average rainfall, July was 161% of the long-term average, and October (October 1 - 21) was 127% of the long-term average (Figure 1). While the total wet season rainfall will likely be close to average, there is still a large rainfall deficit for the preceding year and a half. Recent reports on the U.S. Drought Monitor (National Drought Mitigation Center, University of Nebraska, Lincoln) showed a moderate to severe drought over the Istokpoga basin, especially the downstream area that depends on the lake for water supply (U.S. Drought Monitor, October 16, 2007, http://drought.unl.edu/dm/DM_state.htm?FL,SE).

During 2006, the water level in Lake Istokpoga fell from 39.5 ft at the beginning of the year to below 37.5 ft (the minimum elevation of Zone B in the current regulation schedule) during the summer. The decrease in water levels resulted in part from persistent low rainfall and releases to meet water supply demands. Releases for flood control were made in February when water level

exceeded the regulation schedule. Flood control releases were made again in late August and early September 2006 (Figure 2) because of intense rainfall associated with Tropical Storm Ernesto. The rainfall associated with this tropical event helped raise the water level to 39.07 ft. However, water level began to fall again and was more than 0.5 ft below the high pool stage at the end of the wet season (Figure 2). Water level continued to drop in 2007 reaching 37.25 ft by the end of June and then increasing to the present stage of 38.5 ft. Most of the increase in stage since June was associated with the above average rainfall in July. In 2007, intermittent releases for water supply were made beginning in January and ending June 20. Relatively large releases were made for flood control in late July and early August because the water level exceeded the regulation schedule.

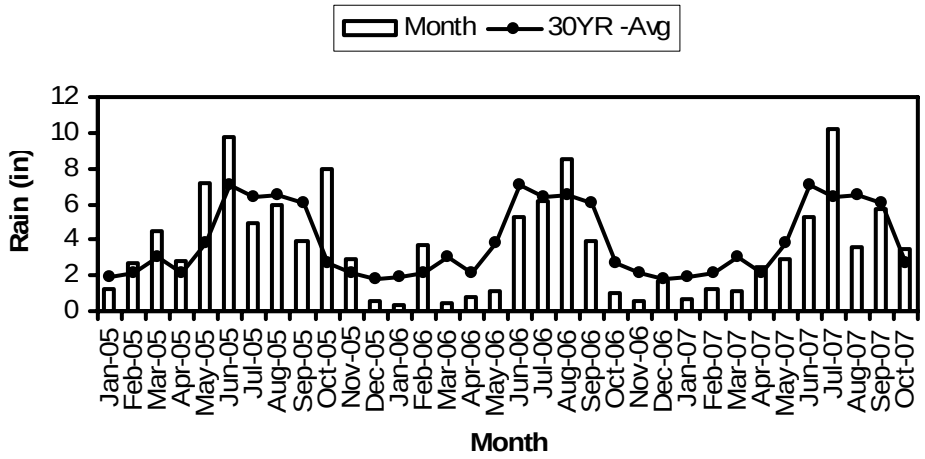

Figure 1. Monthly rainfall total (bars) for January 2005 through October 2007 and the 30 year average (1976-2005) monthly rainfall (line) for the Lower Kissimmee Basin (Source District Monthly Rainfall Reports). Rainfall total for October 2007 is based on the time period October 1-21.

In the rest of the Kissimmee River-Lake Istokpoga Basin, conditions are not much better. In the upper Kissimmee basin, none of the lakes reached their high pool by the end of the 2006 wet season and are not likely to reach the high pool by the end of the 2007 wet season. Most of the lakes, especially the larger lakes have higher water levels than at this time one year ago. Releases from the upper basin for the Kissimmee River Restoration Project were discontinued for 252 days (November 8, 2006 – July 18, 2007). In the coming dry season, the discharge at S-65 will likely be decreased to minimal flows and may have to be discontinued again. The water level in Lake Okeechobee fell to a new all time low of 8.82 ft in July and has only risen to 10.2 ft. The lake has been below the supply side management line for almost one year. Because of low water levels in Lake Okeechobee the G207 pump station at S-71 and G208 at S-72 have not been able to pump water from the lake to meet water supply needs in the lower portion of the Indian Prairie.

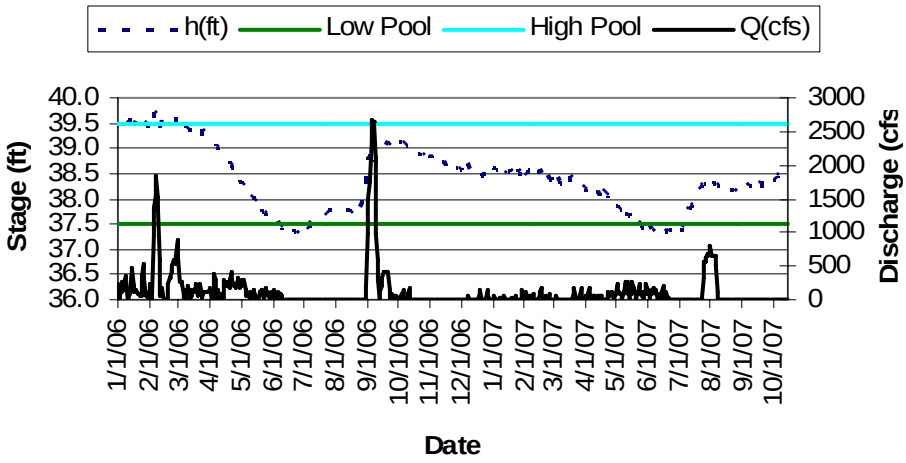

Figure 2. Mean daily stage (dbkey 15956) and discharge (dbkey 15955) for Lake Istokpoga in 2006 and 2007. Horizontal lines indicate the high pool stage of the current regulation schedule at 39.5 ft (blue) and the low pool at 37.5 ft (green).

As a result of low Lake Okeechobee levels, sufficient water is not available to meet the present and anticipated requirements of water users within the Indian Prairie Water Use Basin and the Lake Okeechobee Service Area (LOSA). Beginning in the fall of 2006, a series of water shortage restrictions have been declared affecting users in both the northern and southern portions of the Indian Prairie Water Use Basin and LOSA. These restrictions were geared toward preserving the dwindling water supply and avoiding serious harm to the water resource. As the severity of this drought has increased, so have the restrictions imposed to reduce demands. This is particularly difficult for the agricultural users within the identified basins as water supply demands sharply rise during the hotter spring months.

REQUESTED DEVIATION

The proposed deviation to the regulation schedule for Lake Istokpoga would decrease the lower limit for Zone B, where releases can be made for water supply, to a minimum of 35.5 ft in June (Zone B (proposed) in Figure 3). The previous deviation request would have allowed the water level to decrease only to 36.5 ft. Lowering the minimum stage in Zone B would allow releases from Lake Istokpoga to continue for downstream water supply demands in the Lake Istokpoga/Indian Prairie Basin.

In the current regulation schedule, the Zone B line decreases from 39 ft in mid-October at a variable rate to a low of 37 feet by May 1 (if the pumps adjacent to S-71 (G-207) and S-72 (G-208) are inoperable), remains at 37 ft until June 30, and increases at a variable rate to 39 ft in mid-October. In contrast, Zone B (proposed) line for the temporary deviation drops to 38 ft on November 16 (assuming the deviation can be authorized that quickly). It follows a gradual decrease to 37.18 ft on March 16 and then a more rapid decrease to 35.5 ft on May 31. It remains at 35.5 ft until June 30 and then it begins to increase and is approaching the normal Zone B regulation line by September 30. Thus, the current regulation schedule would allow the water

level to decrease to 37 ft for 61 days while the proposed deviation regulation schedule would allow it to decrease 1.5 ft lower and to remain below 37 ft for 143 days. If the proposed deviation is granted, the changes in lake stage under the deviation regulation schedule will depend on the quantity of rainfall over the basin, the resulting groundwater and surface water inflows, and the demands by downstream water users.

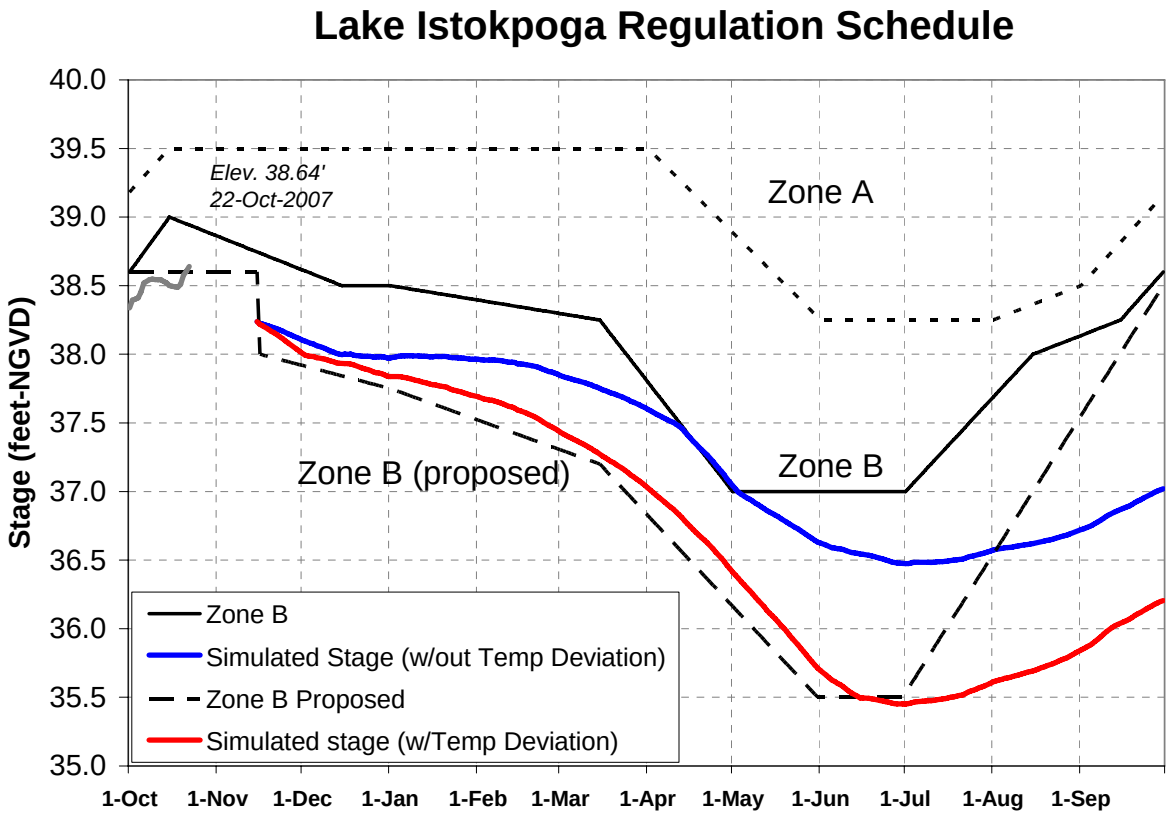

Figure 3. The Lake Istokpoga regulation schedule with the Zone B line when the pumps at S71 and S72 are not active (solid black line) and the Zone B (proposed) for the temporary deviation (dashed black line). Simulated lake stage are shown without the temporary deviation (blue) and with the temporary deviation (red).

Simulation Model Assumptions

To evaluate the effect of the proposed deviation to the regulation schedule on water levels in Lake Istokpoga, a simple hydrologic model was constructed in a spreadsheet. The model was used to evaluate two alternatives (Alt0, Alt1). Alt0 is the current regulation schedule with the Zone B line when the pumps adjacent to S-71 and S-72 are inactive because of low water levels in Lake Okeechobee. The simulation assumes that throughout the simulation period the water levels in Lake Okeechobee remain too low to use the pumps at S-71 and S-72. Alt1 is the proposed deviation represented in Figure 3 by the dashed black line labeled Zone B Proposed. The simulation begins on October 1, 2007 with the lake stage at 38.35 ft and continues with a

daily time-step through September 30, 2008. The model increases lake stage based on 1-in-10 year dry return period monthly rainfall, 1-in-10 year tributary inflows, and seepage from the surrounding aquifer. It decreases water levels due to evaporation from the lake surface and releases for water supply. Water supply deliveries assume that Phase III water restrictions are in force through out the simulation period. Phase III reduces downstream withdrawals and direct withdrawals from the lake by 45%. Water supply demands also assume that none of the demand is met by using the G-207 pump station at S-71 and G-208 pump station at S-72 to pump water from Lake Okeechobee to supply the southern Indian Prairie region.

Simulation Results

For both alternatives, the simulated lake stage decreased to a low point in June-July. For Alt0, water level decreases primarily because of evapotranspiration. Water supply releases are made in mid-April through early May when the lake stage is above the Zone B/Zone C schedule line. Water level for Alt0 declines to a minimum of 36.47 ft on July 1, where it remains for 2 days before increasing to 37.02 feet at the end of the simulation period.

The requested deviation (Alt1) allows water levels to fall faster and lower than the current regulation schedule (Alt0). For Alt1, water level decreases to 35.45 ft on June 27, where it remains for 6 days before increasing to 36.21 feet at the end of the simulation. The requested deviation line allows releases for water supply to be made continuously from November 16, 2007 through June 17, 2008, when the water level drops below 35.5 feet.

The simulation period includes the next dry season and most of the following wet season. Neither simulation of Alt0 or of Alt1 showed much recovery of water levels during the wet season, which results from the simulation using 1-in-10 year rainfall during the wet season. The use of normal wet season rainfall for the next wet season would result in a more rapid rise in water levels. The increase in water level from the minimum in June-July to the end of the simulation period was 0.55 ft for Alt0 and 0.76 ft for Alt1. The differences between the alternatives in the recovery of water levels (increases) may reflect the shape of the lake at the different elevations. Alt1 is starting at a lower elevation and has a smaller surface area. Consequently the same volume of water will raise the lake higher and with a smaller surface area the loss due to evapotranspiration is less. Also, Alt1 has a greater difference in water levels between Lake Istokpoga and the Lake Wales Ridge, which should increase the rate of seepage.

ECOLOGICAL ANALYSIS

The ecological analysis considered the temporary deviation request (Alt1) described in the previous section relative to another alternative - the current regulation schedule (Alt0). Under both alternatives the water level in Lake Istokpoga is likely to go below the normal, regulated lower limit of fluctuation, which may be ecologically significant. Patterns of stage fluctuation are generally accepted as critical determinants of lake ecosystem health (Karr 1991, Hill et al. 1998, Keddy and Fraser. 2000). In Lake Istokpoga, the range of water level fluctuation has been narrowed, which has contributed to environmental problems that have been recognized by stakeholders since the late 1980s (Lake Okeechobee Watershed Project Delivery Team 2004). Each of the temporary deviation alternatives lowers the schedule line for Zone B, which will allow lower lake stages and should increase the range of water level fluctuation. The ecological

analysis considered both the potential for benefit and for harm of the potential decrease of lake stage.

This report draws heavily upon information compiled to support the development of a minimum flow and level (MFL) for the lake, the Lake Istokpoga Schedule Review component of the Lake Okeechobee Watershed Project for the Comprehensive Everglades Restoration Project, and the 2001 drawdown project to enhance fish habitat and provide water supply. It also draws on recent conversations with managers/scientists involved in the management of the lake, representing U.S. Fish and Wildlife Service, Florida Fish and Wildlife Conservation Commission, Highlands County, Audubon of Florida, and the South Florida Water Management District.

A conceptual ecological model (Figure 4) was developed for the Lake Istokpoga Schedule Review (Morales 2005). It relates the major external driving forces acting on the ecosystem to the specific stressors acting within the system to produce ecological effects that can be represented by a limited set of attributes and performance measures. The conceptual model for Lake Istokpoga represents considerable effort by a study team that included scientists and managers from the different resource agencies and stakeholder groups. The model identifies altered water level fluctuation as one of the stressors acting on the managed lake ecosystem (Figure 4). The shaded polygons in Figure 4 represent this stressor, its ecological effects, and the selected attributes. The shaded polygons cover more than half of the figure and indicate that the effects of altered water level fluctuations are far-reaching.

Based on the ecological effects associated with altered water levels in the conceptual ecological model, this ecological assessment focuses on four questions:

1. How does likely stage fluctuation with the deviation compare to the natural patterns of water level fluctuation in Lake Istokpoga?
2. How might the likely changes in water level fluctuation with the deviation affect organic material in the sediments?
3. How might the likely changes in water level fluctuation with the deviation affect plant communities?
4. How might the likely changes in water level fluctuation affect individual species and groups of species of animals in Lake Istokpoga?

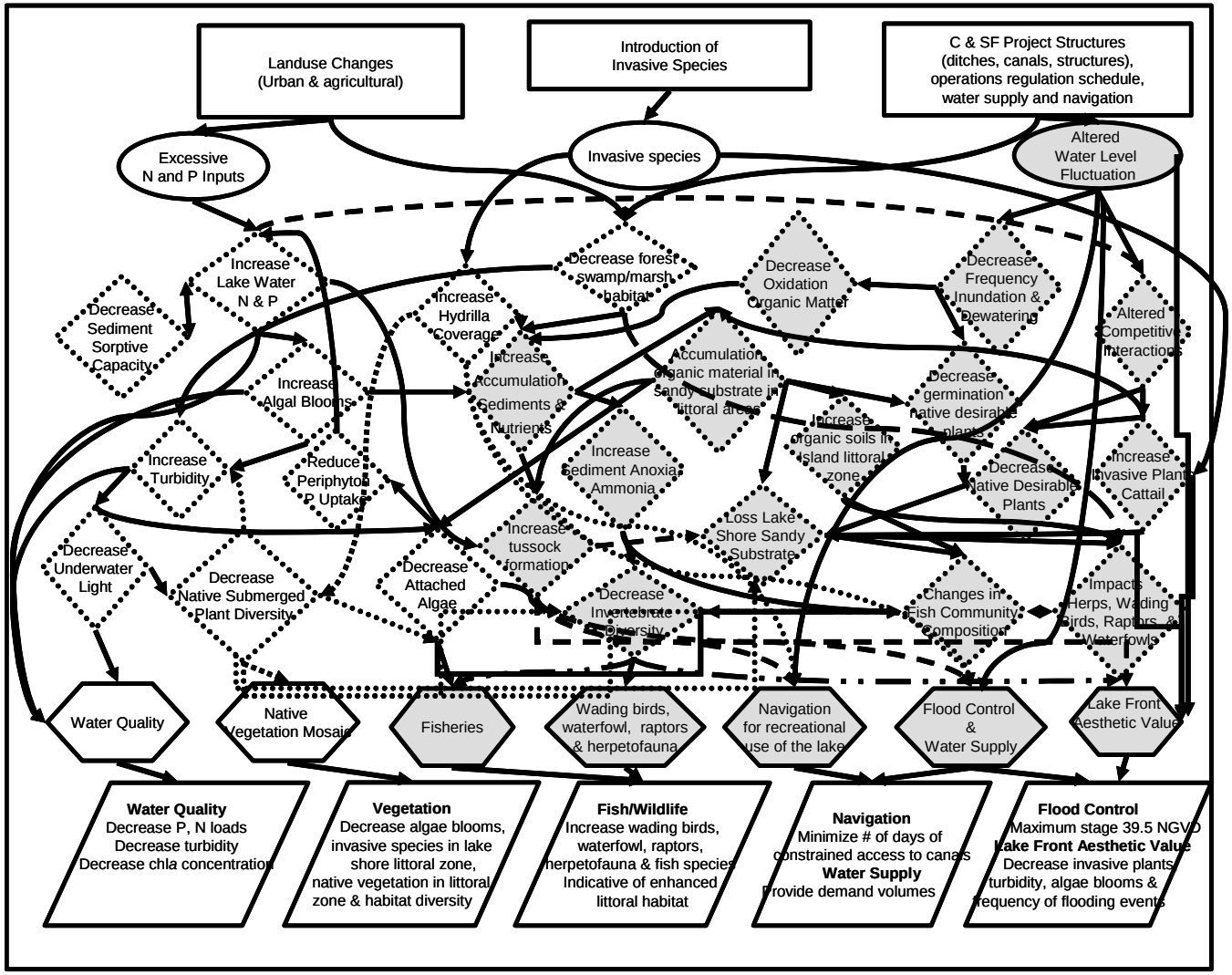

Figure 4. Conceptual ecological model for Lake Istokpoga (based on Morales 2005). Rectangles represent drivers, ovals are stressors, diamonds are ecosystem effects, hexagons are attributes, and parallelograms are performance measures. Shading identifies the altered water level fluctuation stressor and the related ecosystem effects and attributes.

Hydrology

Natural and regulated water levels

For a 26 year period before regulation, water levels in Lake Istokpoga fluctuated between 35.93 ft and 42.9 ft (Figure 5). During this period of time, lake stage fell to 36.5 ft or below on six occasions or with a frequency of about once every four years. These events ranged from a single day in 1939 to 139 days in 1956 (Table 1). These events occurred most often in the May-June timeframe. The events in 1955 and 1956 (events 5 and 6 in Table 1) occurred during severe droughts in the Lower Kissimmee Basin (Table 1). Alt1 would allow the water level to decrease to 35.5 ft. Only, one previous event fell to 35.5 ft or below and this was during an extreme drought in the lower Kissimmee Basin (Table 1).

Table 1. Event duration, minimum stage attained, and drought status for events, when stage dropped below 36.5 ft.

				Minimum		
Event[1]	Start	End	Duration	Stage (ft)	Date	Drought status[2]
1	6/8/1939	6/9/1939	1	36.50	6/8/1939	
2	5/19/1945	6/23/1945	35	36.03	6/20/1945	
3	5/21/1949	6/12/1949	22	36.40	5/24/1949	
4	7/31/1950	9/27/1950	58	36.22	8/25/1950	
5	5/3/1955	6/24/1955	52	36.20	6/9/1955	Severe
6	4/20/1956	9/6/1956	139	35.93	8/12/1956	Severe
7	2/10/1962	6/23/1962	133	35.40	5/30/1962	Extreme
8	5/23/1971	6/28/1971	36	36.20	6/7/1971	Severe
9	3/8/2001	7/7/2001	121	35.84	5/21/2001	Severe

[1]An event was defined as beginning the first day that mean daily stage decreased to 36.5 ft or less and as ending when it increased above 36.5 ft. The years 1950, 1955, 1956, and 1962 contained periods when stage fluctuated around 36.5 ft but did not exceed 37.0 ft. These periods of time were treated as single events.

[2]Drought status was based on Palmer Drought Severity Index for the Lower Kissimmee Basin presented in Abtew et al. (2002).

Water levels in Lake Istokpoga were regulated after the construction of S-68 between October 3, 1960 and January 10, 1962 (U.S. Army Corps of Engineers 1994). The original regulation schedule only allowed water levels to fluctuate between 37.5 ft and 39.5 ft. In March of 1990, the regulation schedule was modified to improve water supply and navigation. The result was a further narrowing of the range of water level fluctuation from 38 ft to 39.5 ft.

Since 1962, water levels have fluctuated between 35.40 ft and 40.06 ft (Figure 5). The narrowing of stage fluctuation by regulation and the change in regulation schedules is evident in Figure 5. After regulation, water levels dropped to 36.5 ft or less on three occasions (Table 1). The first occurred in 1962 just after the construction for S-68 was completed and during an extreme drought for the Lower Kissimmee Basin. The second was in 1971 when the Lower Kissimmee Basin was in a severe drought. The third occasion was in 2001, another severe

drought year. Also in 2001, the lake was lowered for a drawdown for a habitat improvement project as well as providing water supply for downstream users in the Lake Istokpoga/Indian Prairie Basin. The water level decreased to 35.84 ft almost reaching Alt1's lower limit of 35.5 ft.

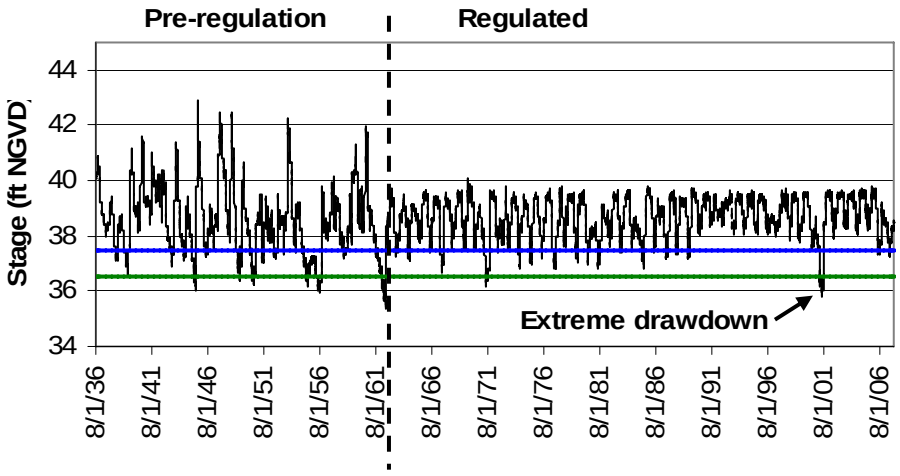

Figure 5. Mean daily stage in Lake Istokpoga from August 1, 1936 through the present. The vertical dashed line indicates when the S-68 water control structure was completed and divides the time series into a pre-regulation period and regulated period. Horizontal lines indicate 37.5 feet, the bottom of Zone B (blue), and 36.5 feet, the bottom of the proposed Deviated Zone C1 (green). The arrow indicates the drawdown project in 2001. This nearly continuous time series of mean daily stage was created by combining two time series (dbkeys) from the SFWMD's hydrologic data base DBHYDRO. These time series were for August 1, 1936 through September 26, 1993 (dbkey 15956) and September 27, 1993 through October 14, 2007 (dbkey 15956).

In 10% of the pre-regulation years (10^{th} percentile line), mean daily stage drops to 36.5 ft or below during late May and early June (Figure 6). By late June, mean daily stage begins to increase and continues over the wet season.

In summary, the analysis of pre- and post-regulation stage fluctuations shows that the water level in Lake Istokpoga has rarely went as low as the minimum water level for Alt1. Prior to regulation it only dropped as 35.93 ft during a severe drought (Table 1).

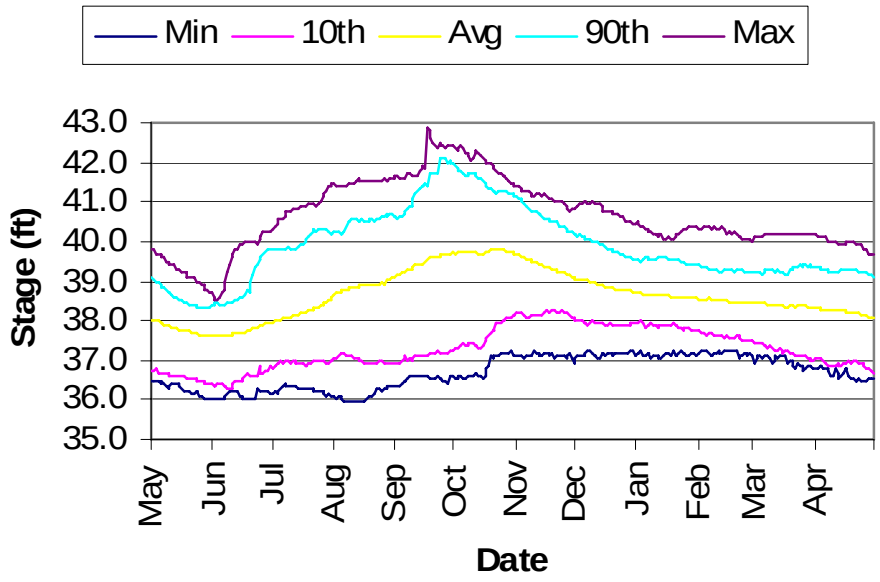

Figure 6. The minimum, 10th percentile, average, 90th percentile and maximum of mean daily stage for each day of the year based on the pre-regulation period of record (August 1, 1936 through April 30 1961).

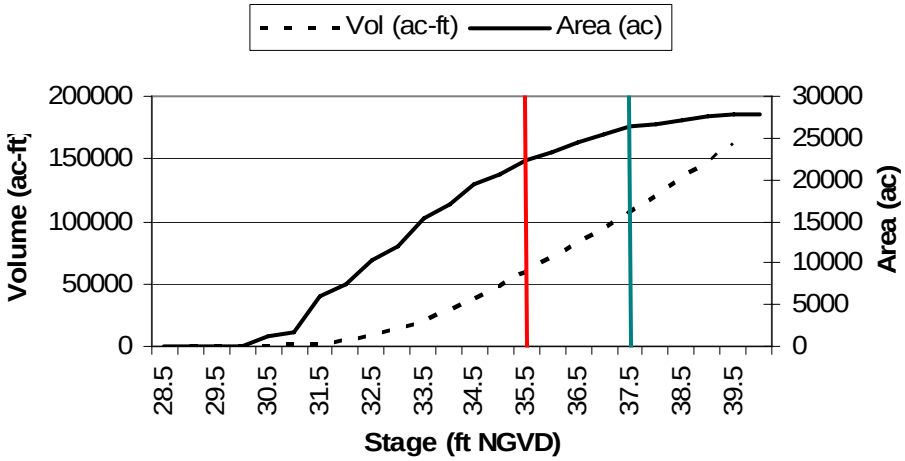

Figure 7. Relationship of lake volume and lake surface area to stage (water level elevation) in Lake Istokpoga. The vertical lines indicate the minimum elevations for Alt0, the current regulation schedule (green) and for Alt1 (red). Redrawn from Figure 14 (Water Supply Department 2005) and based on data from ReMetrix LLC (2003).

Regulatory Framework

Minimum Flows and Levels

A Minimum Flow and Level (MFL) for Lake Istokpoga was adopted by the South Florida Water Management District Governing Board on December 14, 2005 and subsequently published in the Florida Administrative Weekly. The rule states that "An MFL violation occurs in Lake Istokpoga when surface water levels fall below 36.5 feet NGVD for 20 or more weeks, within a calendar year, more often than once every four years". The minimum elevation for Alt1 is below the threshold for beginning an MFL violation. For an MFL violation to occur, the stage would have to fall below 36.5 ft and remain there for at least 20 weeks. The simulated lake stage for Alt1 goes below 36.5 ft before May 1 and does not rise above it before the end of September when the simulation ends. Thus, water levels will likely be below the 36.5 ft threshold for longer than 20 weeks. For a violation of the MFL to occur, a second such event would have to happen in the next four years.

Lake Istokpoga Regulation Schedule Review

The Lake Istokpoga Regulation Schedule Review was added as a component to the Lake Okeechobee Watershed Project to address concerns by stakeholders of the impacts of water level fluctuation (Lake Okeechobee Watershed Project Delivery Team 2005). The purpose of the schedule review is to examine ways of modifying the regulation schedule to improve ecological conditions while maintaining flood control and water supply functions. The plan formulation document recommends an operating strategy that uses El Nino/La Nina forecasts and the Palmer Drought Severity index to select among three rule curves. Under strong La Nina conditions and when the Palmer Drought Severity Index is low, a rule curve is recommended that drops to 36.5 ft during May-early June. Alt 1 would allow lake stage to go 1 ft lower. While the recommended schedule for Lake Istokpoga has not been adopted, the U.S. Army Corps of Engineers has issued a Notice of Intent to include the Lake Istokpoga Regulation Study in the Draft Environmental Impact Statement for the Lake Okeechobee Watershed Project (Federal Register September 17, 2003 Volume 68 No 180 Page 54431).

2001 deviation for water supply and habitat enhancement

In 2000, south Florida was experiencing a regional drought. In the spring of that year, the stage in Lake Istokpoga decreased to the minimum elevation of the regulation schedule of 37.5 ft. Rainfall during the wet season began to raise lake stage. However, it only increased to 38.69 ft on October 9 and did not reach the maximum elevation of the regulation schedule line of 39.5 ft. In January 2001, the South Florida Water Management District requested a deviation from the U.S. Army Corps of Engineers that would take advantage of the already low water levels and continue to lower them to facilitate a habitat enhancement project by the Florida Fish and Wildlife Conservation Commission that was planned for 2003 and in doing so continue to make releases to meet water supply demands in the Lake Istokpoga/Indian Prairie Basin.

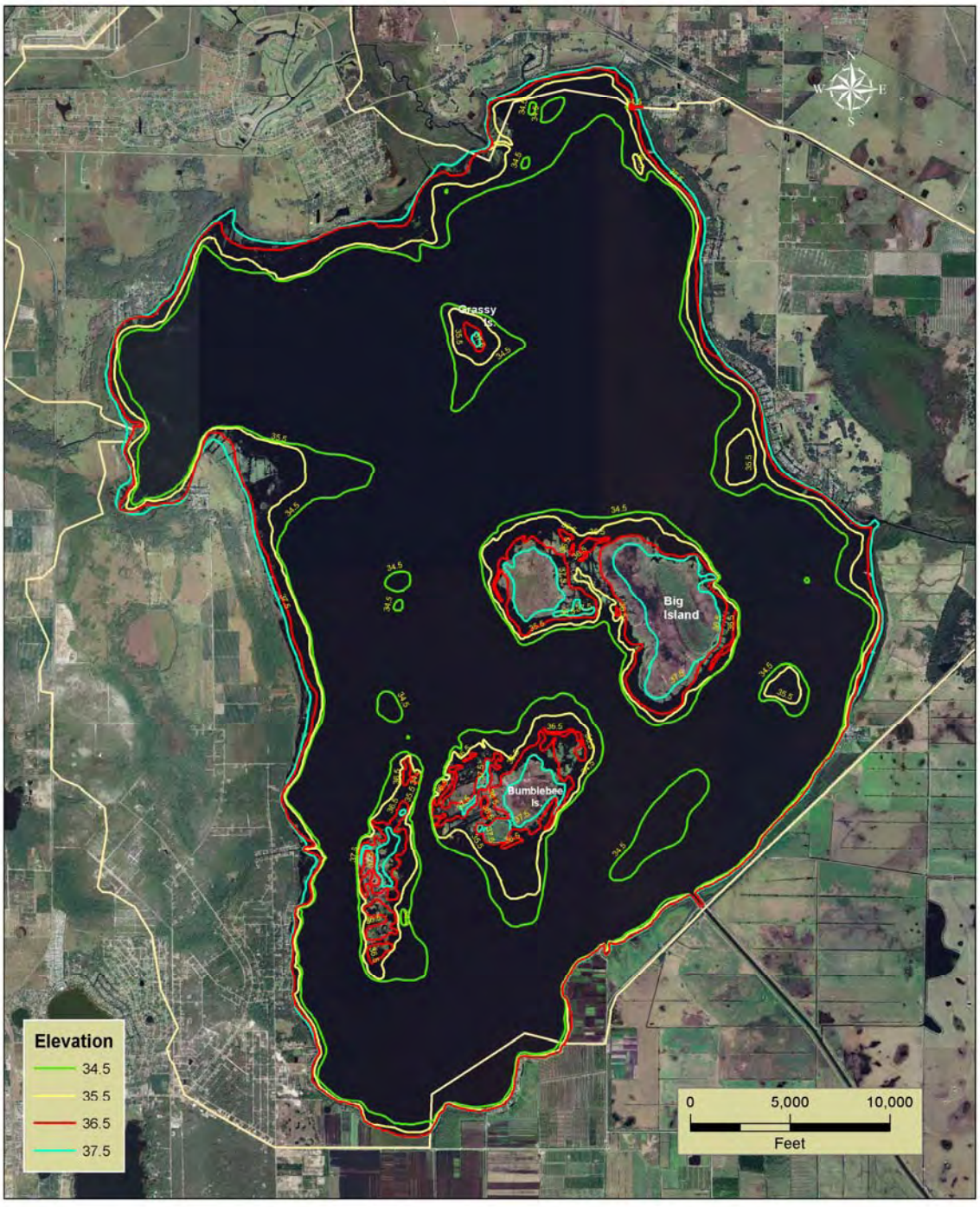

Figure 8. Digital orthoquad of Lake Istokpoga from 2004 with contour lines for 34.5 ft (green); 35.5 ft, the minimum elevation for Alt1 (yellow); 36.5 ft (red); and 37.5 ft (ReMetrix LLC 2003).

Stage regulation narrowed the range of water level fluctuation in Lake Istokpoga and allowed the development of undesirable monocultures of cattail (*Typha* sp.) and floating vegetation mats (tussocks). This vegetation impacted >1,800 acres of the littoral zone and was expanding by 100 acres per year (Champeau et al. 1999). The Florida Fish and Wildlife Conservation Commission's plan involved lowering the lake to 36.5 ft for an extended period of time to allow lake sediments to dewater and consolidate. As sediments dried out, earth moving equipment was used to remove unwanted vegetation and organic sediments from the littoral zone. A key element of this plan was coordinating with the Florida Department of Environmental Protection and Highlands County on a large-scale chemical treatment of hydrilla that reduced coverage from 70% to less than 5%.

In March 2001, stage fell to the target of 36.5 ft (Figure 9). It continued to drop from evapotranspiration and eventually reached 35.88 ft by June 19. Lake stage was at 36.5 ft or below for 121 days. After reaching the minimum elevation of the deviation schedule, water levels rose quickly to reach the maximum elevation of the regulation schedule line of 39.5 in late September.

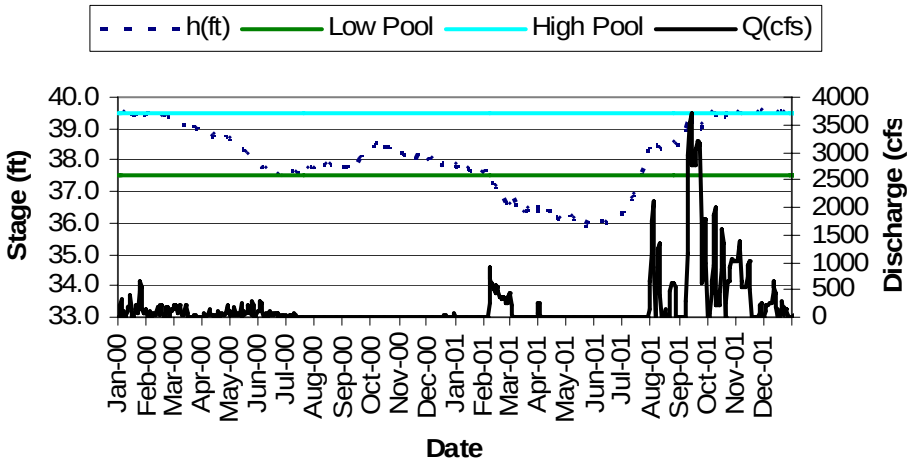

Figure 9. Mean daily stage and discharge at S-68 during 2000 and 2001. The horizontal lines represent the high pool stage of the regulation schedule at 39.5 ft (blue) and the low pool stage of 37.5 ft (green).

Between March and July, 1,308 acres (21 miles of shoreline) were scraped and an estimated 2,370,420 cubic yards of tussocks/muck were removed to upland disposal sites or consolidated into in-lake islands (Champeau and Furse 2002). Champeau and Furse (2002) indicated that cleared areas had improved water quality and recruitment of desirable aquatic plants, increased utilization by fish and wading bird, improved aesthetics, and had other economic/social/recreational benefits. No harmful effects from the low stage have been documented. Positive responses by submersed aquatic vegetation and swamp forest are described below under Plant Responses.

The plan for the 2001 drawdown also considered a drawdown to 34.5 ft, which is 1 ft lower than Alt1. The 34.5 ft option was rejected because of the uncertainty of rapid refill because of the absence of upstream reservoirs of sufficient size (Champeau et al. 1999).

In summary, the three regulatory examples (MFL, regulation schedule review, and the 2001 deviation) described above suggest that water levels in Lake Istokpoga could be lowered to 36.5 ft without negatively affecting the lake. Alt1 will allow water levels to go to 1 ft lower to 35.5 ft and the simulated water level would also exceed the duration component of the MFL. Thus, two of the criteria for an MFL violation would be met, but a violation would require a second such event within a four year period.

Organic sediments

The current regulation schedule reduces the range of water level fluctuation and the opportunity for the accumulating organic material to decompose aerobically. The accumulation of organic material over a forty year period was one of the issues that the drawdown of 2001 was designed to address. During the drawdown, most of the organic material was physically moved to upland disposal sites or to in-lake spoil islands. It is not known how much decomposed in situ. Any lowering of water levels as a result of the proposed deviation is likely to allow some additional decomposition of organic material to occur. The amount of decomposition that occurs will depend on how much the stage is lowered and for how long.

Plant responses

Lake Istokpoga supports three plant zones that are related to water depth (Milleson 1978, Water Supply Department 2005). The bald cypress/mixed hardwoods swamp is generally found at elevations of 39.5 ft and higher. Littoral zone emergent vegetation marsh generally resides between 36.5 and 39.5 ft. Submerged aquatic vegetation may occur at elevations less than 36.5 ft. The spatial extent of these three zones may be influenced by changing water levels.

Bald cypress (Taxodium distichum)/hardwoods swamp

This swamp forest is dominated by bald cypress (*Taxodium distichum)*. Cypress and other hardwoods provide important nesting habitat for several species of birds including several species of special status. Since the range of water level fluctuations was reduced in 1962, these trees have been unable to reproduce. During the 2001 drawdown, the lowered water levels allowed some seedlings to sprout from existing seeds. Unfortunately these seedlings were drowned during the rapid refilling of the lake from rainfall (Personal communication, John Zahina, South Florida Water Management District). Alt1 may allow water levels to decline to a level that allows more seedlings to sprout. If seedlings of bald cypress or hardwoods sprout this year, the possibility of managing the water to slowly refill the lake should be considered and potentially evaluated against the need for a faster refill for other purposes.

Emergent vegetation

Lowering of water levels should increase the area in which seeds of emergent plants can germinate. A recent description restricts the emergent plant zone to 36.5 ft or above (Water Supply Department 2005). However, Milleson (1978) reports Bulrush (*Scirpus californicus*) reaching 35.5 ft and cattail (*Typha latifolia*) reaching 35.7 ft in Lake Istokpoga. Milleson's

observations were made between August 1973 and September 1976. During the years before and during his study, lake stages dropped to low levels. Mean daily stage dropped to 36.2 ft on June 2, 1971, and dropped below 37.5 ft in 1974, 1975, and 1976. This suggests that lowering the lake may temporarily extend the area of emergent vegetation. Alt1, which would allow water levels to decrease to 35.5 ft, might allow some increased recruitment of emergent vegetation.

The use of 36.5 ft as the lower elevation for the emergent vegetation zone is a critical piece of information for this assessment, but the discussion above suggests that the edge of the emergent vegetation is dynamic. A field assessment of Lake Istokpoga was conducted on Monday October 15, 2007, to determine if 36.5 ft was still a reasonable threshold for the edge of the emergent vegetation zone. Water depth was measured at the lakeward edge of emergent vegetation beds at haphazardly selected locations on both the east and west sides of the lake. On that date, the water surface elevation was 38.52 feet. Water depth measurements were repeatedly >80 cm (2.62 ft) which corresponds to an elevation of 35.89 ft. In some locations, bulrush stands extended into water >100 cm deep (>3.28 ft) which corresponds to an elevation less than 35.24 ft. Beds of water lilies occurred in deeper water. These measurements suggest that the 36.5 ft elevation is overly conservative for edge of emergent vegetation this year. Lowering the water level to 35.5 ft will dry out most of the emergent vegetation zone, but shallow water should remain in some areas.

Submersed vegetation

Lower water levels will allow more light to reach the bottom of the lake, which can promote the growth of native submergent vegetation such as Illinois pondweed (*Potamogeton illinoesis*) and eelgrass (*Vallisneria americana*). During and following the 2001 drawdown, the coverage of Illinois pondweed and eelgrass increased to several hundred acres north of Bumblebee Island and Big Island (Personal observation, Beacham Furse, Florida Fish and Wildlife Conversation Commission). This expansion lasted for about 2.5 years. The decline of eelgrass and Illinois pondweed was probably due to multiple factors including increased wave action because of the loss of hydrilla beds that had buffered wave action and decreased light levels due to increased turbidity and higher water levels. In 2003, water levels never dropped below 38.24 ft (Figure 5). The simulated lake stage for Alt1 went approximately 1 ft lower than the lowest water levels during the 2001 drawdown and may elicit a similar or larger increase in the coverage of submersed vegetation if there is a viable seed source.

Hydrilla

Hydrilla (*Hydrilla verticillata* (L.F.) Royle) is a submersed, exotic plant that can grow at low light levels and may elongate as rapidly as 1 inch per day (reviewed in Langeland 1996). When hydrilla reaches the surface of the lake, it branches to form mats, which intercept the sunlight and shade slower growing submersed plants. It was first detected in Lake Istokpoga in 1979 and covered less than 4 acres until 1982 (O'Dell et al. 1995). Since then, it has undergone several periods of increase to cover 71% of the lake in 1988, 94% in 1996-97, and 70% in 2001 (Water Supply Department 2005). Large-scale chemical treatments with the herbicide fluridone were used to bring hydrilla under control. Because of the repeated treatments with fluridone, the strain of hydrilla in Lake Istokpoga has developed a resistance to this herbicide. Currently, hydrilla covers a relatively small portion of the lake, and the Florida Department of Environmental Protection and Highlands County are trying to keep it under control.

One reason hydrilla is so difficult to manage is that it produces a vegetative reproductive structure commonly referred to as a tuber (not a true tuber but a subterranean meristem or turion). Tubers can be produced in large numbers and lie dormant in the sediments for at least four years, where they are relatively well-protected from chemical treatments. Recently the Florida Department of Environmental Protection estimated that hydrilla tubers were present in 25,000 of the lake's 27,000 acres (Lake Okeechobee Watershed Project Delivery Team. 2004b). The only factor demonstrated to significantly increase sprouting rates is an artificial drawdown, which can increase sprouting rates to 75-95% after the site is inundated (Haller et al. 1976 cited in Netherland 2005). It is difficult to predict how hydrilla might respond to changes in water levels associated with the three proposed temporary deviations. For example, the only tubers that sprout because of the deviation may be confined to the area exposed by a temporary deviation alternative. Regardless, the potential for stimulating the growth of hydrilla should be taken seriously because of the limited options for treatment.

Animals

Snail Kite (Rostrhamus sociabilis Ridgway*)*

The snail kite is a federally Endangered species that is vulnerable to water level management. Snail kites typically nest in low vegetation (3-9 ft) over water, which serves as a barrier to terrestrial predators. The eggs are incubated for 24-30 days in Florida, fledging occurs in 23-34 days, and the adults continue to feed fledglings until 9-11 weeks old (Sykes et al. 1995). Rapidly falling water levels can leave a nest exposed to predators.

Snail kites have not nested in large numbers on Lake Istokpoga in the past. In 2007, only three nests were attempted; these were constructed on cypress trees and cattail stems. If the proposed deviation is implemented, falling water levels may expose snail kite nests to terrestrial predators. Falling water levels can also decrease the support for herbaceous vegetation, such as cattail, and cause the plant stem to bend spilling the contents of the nest. This is a common cause for losing nests in herbaceous vegetation (Sykes et al. 1995).

The regional drought negatively impacted snail kites throughout most of south Florida (Table 3). The only large concentration of nests in 2007 occurred on Lake Tohopekaliga and Lake Kissimmee in the upper Kissimmee basin, and these nests successfully fledged young kites. Water levels in these lakes are slightly higher than they were at this time last year and should be conducive to snail kite nesting in 2008. The South Florida Water Management District is continuing to work with the USFWS on snail kite-water management issues in the upper basin and plans to repeat the more gradual spring stage recession in Lake Tohopekaliga in 2008 to increase the chances for nesting success.

Florida apple snails (Pomacea paludosa Say*)*

Florida apple snails are important as the primary food source for the endangered snail kite and the limpkin, a Species of Special Concern. Apple snails tend to occur in locations with sandy substratum and emergent vegetation. Apple snails climb emergent plant stems and other structures to lay eggs. If stranded by falling water levels, apple snails usually don't move. They may survive by using the operculum to close the shell opening to prevent desiccation. Darby et al. (2004) reported that 7 of 23 stranded apple snails in Lake Kissimmee survived longer than six

weeks and may have survived longer if they were not eaten. Stranded apple snails are vulnerable to predators including snail kites and limpkins. There is some evidence that the snails can move to deeper water to avoid being stranded (Darby et al. 2002).

Because the Florida apple snail has a lifespan of only 1-1.5 years, the failure of a year class can greatly reduce the number of apple snails in the population. Egg-laying peaks in April and May, when the simulated water levels for Alt1 will be falling between 37 ft and 35.5 ft. Eggs take 2-3 weeks to hatch. During this time, much of the emergent vegetation zone, where the eggs are laid, will be drying out. It will take several weeks before the snails have grown large enough to withstand drying. It is possible that some young snails may survive by moving to deeper water. It is also possible that the adults will move towards deeper water before laying eggs. The potential exists for the deviation to reduce the number of apple snails available the following year. If this happens, it may take several years for the population to return to pre-deviation levels.

Table 4. Number of snail kites and nests reported for different locations in south Florida (from snail kite update email from Tylan Dean, U. S. Fish and Wildlife Service on April 18, 2007).

Region	Site	No Birds	No Nests	Comment
Southern	Everglades National Park	6	0	
	Big Cypress	0	0	
	WCA 3A	128	0	6 nests abandoned
	WCA 3B	0	0	
Central	WCA 2A	0	0	
	WCA 2B	23	0	
	Loxahatchee NWR	0	0	
	Grassy Waters	57	0	Potential for nesting
	Lake Okeechobee	0	0	16 kites observed in Jan survey
	Lake Istokpoga	13	1	
	Hungry Land	0	0	Dry
Northern	St Johns Marshes	2	0	Dry conditions; nesting unlikel
	Lake Kissimmee	30	6	Nesting activity observed
	East Lake Tohopekaliga	2	0	
	Lake Tohopekaliga	130	48	

Osprey (Pandion haliaetus)

The Osprey is considered a Species of Special Concern by the state of Florida (Florida Fish and Wildlife Conservation Commission 2006). Lake Istokpoga supports one of the highest concentrations of osprey nests in the world (Pranty 2002). This population has been the subject of long-term demographic study (Personal communication, Michael McMillan, Florida Fish and Wildlife Conservation Commission). Osprey feed mainly on fish that they capture near the

water's surface. Lowering the water level is likely to improve foraging conditions for osprey by concentrating fish in large areas of shallow water.

Wading Birds

In Lake Istokpoga, Bumblebee Island and Big Island and their surrounding marsh complex are important locations for wading bird rookeries. These islands can support several thousand nesting pairs of birds (Audubon of Florida 2005). Several species of wading birds nest on these islands including great egret (*Ardea alba*), least bittern (*Ixobrychus exilis*), and several Species of Special Concern in Florida - limpkin (*Aramus guarauna*), white ibis (*Eudocimus albus*), snowy egret (*Egretta thula*), and little blue heron (*Egretta caerulea*) (Florida Fish and Wildlife Conservation Commission 2006).

If water levels drop to 35.5 ft (Alt1), the islands will still be isolated from shore (Figure 8), which should help protect nesting birds. Dropping water levels may also create new foraging opportunities around the island by stranding fish and invertebrates in the marsh as it dries out and by creating large shallow areas around the islands that may attract forage fish, especially if submersed aquatic vegetation begins growing in these areas as it did following the 2001 drawdown.

Audubon's Crested Caracara (Caracara cheriway)

This species has been assigned Threatened status by the state of Florida (Florida Fish and Wildlife Conservation Commission 2006). It prefers open grasslands but will forage in wetlands. Lowering water levels will dry out a portion of the marsh and may provide this species with increased habitat for foraging. Alt1 will allow water levels to decline to 35.5 ft, which should dry out most of the emergent vegetation zone around the lake.

Fish

At least 38 species of fish occur in Lake Istokpoga (Water Supply Department 2005). Four species are of particular importance to fishermen: black crappie (*Pomoxis nigromaculatus*), redear sunfish (*Lepomis microlophus*), bluegill (*Lepomis macrochirus*) and largemouth bass (*Micropterus salmoides*). The lake has been designated a Fish Management Area by the Florida Fish and Wildlife Conservation Commission and supports a fishery valued at $6 million (Champeau and Furse 2002). The largemouth bass fishery is considered one of the finest in the state (Stout 2002).

The proposed temporary deviation can affect fish directly by lowering water levels and indirectly through changes in habitat conditions. The lower water levels can improve conditions for nest-spawning fish by exposing sediments to aerobic decomposition of organic material. Lower water levels may increase germination and growth of native submersed plants, such as eelgrass and pondweed, which can provide better cover for many species of fish and support higher densities of invertebrate prey. During the 2001 drawdown, water levels decreased to 35.88 ft in mid-June for short time without harm to the fishery. The simulated water levels for the proposed deviation 35.45 ft in June and increase more slowly than was observed in 2001. The simulated water levels were lowest in June and July, when water temperatures will be approaching their maximum and when the concentration of dissolved oxygen will be approaching its minimum.

These conditions may favor the development of a fish kill especially if large areas of vegetation, such as hydrilla, are treated.

Social/Economic

Lake Istokpoga is an important component of the local economy in Highlands County. The lake is visited by approximately 60,000 recreational boaters annually (Pranty 2002). In a one year period, 190,637 people used the lake, and a little over half came from outside of Highlands County, who spent $2.3 million in the county (Bell and Bonn 2004). The lake has an excellent largemouth bass fishery (e.g. Stout 2002) that supports four fishing camps, fishing guides, and attracts several fishing tournaments a year. The diverse wildlife using the lake also creates opportunities for ecotourism.

Public access to Lake Istokpoga is impaired at a water level of 36 ft (Table 4), which is 0.5 ft higher than the minimum allowed in the deviation request. Access issues begin at higher water levels and are enhanced by the presence of hydrilla. The simulated lake stage falls below 36 ft for >3 months beginning in May (Figure 3). This extended period of time with impaired access has the potential for social and economic impacts on the local community.

Table 4. Access issues related to stage for public and private boat ramps in Lake Istokpoga (based on Table 19 of Water Supply Department 2005).

Lake Stage (ft)	Private Access Status	Public Access Status[1]
≥38.0	Minimum impact	No impact.
37.5-37.99	Impaired access	Minimum (start) impact. At these stages, difficulties in getting boats into water and navigating the lake are observed.
37.0-37.99	Severely impacted	Impaired access. Problems at public boat ramps for large boats.
36.5-36.99	No private access	Severely impaired access. All public ramps will experience impaired access for pontoon boats and for all, non-shallow-draft boats. There is approximately 50% more access impairment than at 37.0 feet. No access from RV parks. Fish camps still have limited access. Shallow depths greatly limit area of navigable water.
36.0-36.49		Limited access through fish camps. Public can access the lake through two of the fish camps for a boat ramp fee. Access at public boat ramps is limited to non-motorized /electric-motor boats (canoes etc.), small engine johnboats, that can be manually launched (carried/pushed) and airboats.
<36.0		All public access is impaired.

[1]The effect of stage on access and navigation is compounded by the presence of hydrilla in Lake Istokpoga.

ALTERNATIVE WATER SUPPLY FROM THE KISSIMMEE RIVER RESTORATION PROJECT

At the time of the previous deviation request, another alternative was considered to meet water supply demands in the Lake Istokpoga/Indian Prairie Basin. This alternative involves pumping water from the Kissimmee River over the G-85 structure in the Istokpoga Canal to replace water being released from Lake Istokpoga for water supply demands. The Istokpoga Canal connects to the Kissimmee River in Pool C near the downstream end of construction for Phase I of the Kissimmee River Restoration Project. After this option was proposed, several issues emerged that make it impractical. At that time, these issues included the stability of the G-85 structure, conveyance capacity of the Istokpoga canal, reduction of the quantity of water available in the Kissimmee River, and the potential for impacts on the Kissimmee River Restoration Project. These issues are summarized in this section. Since the last deviation request, releases have been reestablished from the upper Kissimmee basin to the Kissimmee River. The discharge at S-65 is approximately 500 cfs. However, it is likely that releases at S-65 will be reduced soon and may possibly end during the coming dry season. Issues 4 and 5 described below refer to conditions at the time of the previous deviation request and do not reflect current conditions. However, they may become relevant again later in the dry season.

1) Installation and operation of the pumps may cause G-85 to collapse. G-85 is an older structure and consists of a concrete-reinforced sheetpile weir with upright supports and flashboards. The uprights in this flashboard structure have far exceeded their useful life. They have not been repaired because the U.S. Army Corps of Engineers will replace the structure as part of the Kissimmee River Restoration Project. In its current state, any vibration from construction or pump operation could cause the structure to collapse. If this happened, water would flow from Lake Istokpoga to the Kissimmee River because the lake stage is >3 feet above that of Pool C of the Kissimmee River.
2) Construction of the S-67 structure to replace the G-85 structure poses a barrier to the movement of water in the Istokpoga Canal. The U. S. Army Corps of Engineers has begun work to construct the S-67 structure to replace G-85 as part of the Kissimmee River Restoration Project. Their contractor, Shaw, submitted a dewatering plan on Tuesday March 27, 2007. This plan calls for about 800 feet of canal, including G-85, to be dewatered. Consequently, any pump that is set up would need about 1,000 feet of pipe to clear their obstruction/dewatered project area. At this point, this option is no longer being pursued.
3) The H&H and Operations offices of the U.S. Army Corps of Engineers stated on Tuesday March 27, 2007 that the present canal stage in the Istokpoga Canal can only support about 40 cfs (50 at best) of flow from the Kissimmee River to G-85, which is significantly less than the desired 200 cfs. The canal cross section has been reduced due to siltation and vegetation.
4) Pool B-C of the Kissimmee River contains a relatively small volume of water. Inflows from the upper basin ended on November 8, 2006, and the river has been without flow for over 140 days. Based on stage-storage tables supplied by the U. S. Army Corps of Engineers and adjusted for loss of storage due to backfilling, Pool B-C contains an

estimated volume of 18,005 ac-ft. Pumping 200 cfs for 24 hr/day could consume that volume in 45 days if these losses were not offset by inflows or rainfall (Table 5).

5) The above calculations suggest that pumping water from the Kissimmee River could lower water levels fairly quickly with negative impacts. At the current stage, water depth is very shallow in the river channel near the upstream end of the restoration project. Motor boats frequently bottom out on mid-channel shoals or extended point bars. Drying of the river channel is an ecological concern. The exposed channel sediments may provide new habitat for opportunistic, invasive terrestrial plant species. While the reestablishment of flow to the river channel could kill these plants fairly quickly, decomposition of the resulting detritus could reduce dissolved oxygen levels. Falling water levels will likely result in the loss of many organisms. Organisms with little mobility, especially many invertebrates, will die from desiccation if they cannot find refuge by burrowing into sediments. Falling water levels will tend to concentrate mobile organisms such as fish and some invertebrates at the lower end of the pool. Crowding conditions will increase the potential for a fish kill if there is a sudden increase in temperature and a decrease in the concentration of dissolved oxygen. We are approaching the seasonal window of June through October to be concerned about low dissolved oxygen and possible fish kills. Also, falling water levels are likely to cause anoxic surficial groundwater to enter the river channel, thereby increasing the potential for concentrations of dissolved oxygen that are low enough to be harmful to fish and invertebrate communities. Unlike the deviation request for Lake Istokpoga, which would allow water level to decrease to a natural low level, the lack of flow is not a natural condition for the Kissimmee River and especially for this extended time period. Also, falling water levels will force animals out of the restored reach of river channel and into the C-38, which is very poor habitat.

Table 5. Calculation of number of days to drain Pool B-C of the Kissimmee River assuming 200 cfs for 24 hr/d and no inflows, rainfall, or evapotranspiration. Storage estimates are for the Pool B-C stage of 34.90 ft on April 2, 2007.

	Pool B	Pool C	Total
Stage-storage table (ac ft)[1]	8800	27210	36010
*0.5 to adjusted for backfilling[2]	4400	13605	18005
Calculate daily rate 200 cfs/d *1.98 ac-ft/1 cfs/d	396	396	396
Time to drain the river (days)	11	34	45

[1]Stage-storage table was supplied by the U. S. Army Corps of Engineers and is for the channelized Kissimmee River.

[2]Stage-storage values were multiplied by 0.5 to adjust for the loss of storage volume by backfilling the C-38. This adjustment is only approximate but it is also conservative.

CONCLUSIONS

The potential effects of the proposed deviation to the Lake Istokpoga regulation schedule (Alt1) was considered relative to the existing regulation schedule (Alt0). Alt1 has potential to provide some benefit and some harm to the lake ecosystem. The two biggest concerns identified were the potential for impacts on nesting of the endangered snail kite and the survival of its principal prey the apple snail, and the potential to exacerbate an existing chronic problem with hydrilla management. These issues are summarized below.

At the time of the previous deviation request, another alternative was considered that involved taking water from the Kissimmee River. This alternative was rejected because it was not physically possible and because it was likely to negatively impact the restored reach of the river.

1) It is generally recognized that an increase in water level fluctuation in Lake Istokpoga to more closely resemble the pre-regulation pattern would be ecologically beneficial.
2) The proposed deviation alternative (Alt1) would increase the range of water level fluctuation by allowing releases to meet downstream water supply demands to lower water levels as low as 35.5 ft between June 1 and June 30. Simulated lake stage, based on the 1-in-10 year dry return interval rainfall, indicates that water levels would not increase as rapidly as the regulation schedule.
3) Prior to regulation, the lowest water level recorded for Lake Istokpoga was 35.93 ft during a severe drought. Shortly after regulation the water level fell to 35.40 ft during an extreme drought.
4) The minimum elevation of 35.5 ft for Alt1 is 1 ft below
    a. the minimum stage threshold component for the MFL,
    b. the low stage for a dry year in the recommended schedule from the Lake Istokpoga schedule review,
    c. the low stage used in a 2001 deviation to provide water supply and facilitate a drawdown habitat enhancement project that resulted in several positive benefits (growth of submersed vegetation and bald cypress seedlings).
5) Depending on water levels and duration, the deviation could produce several benefits for Lake Istokpoga including:
    a. Drying of sediments to promote the germination of cypress seedlings and seeds of emergent vegetation,
    b. Create areas in the lake which are sufficiently shallow to allow adequate light penetration to support native species of submersed vegetation such as pondweed and eelgrass,
    c. Allow some decomposition of organic matter.
6) The species of greatest concern with respect to Alt1 are the endangered Everglades snail kite and its prey the Florida apple snail. Only a small number of snail kites attempted to nest on Lake Istokpoga in 2007. Most of the nesting occurred in the upper Kissimmee basin. In 2007, the South Florida Water Management District repeated the gradual spring recession in Lake Tohopekaliga to facilitate snail kite nesting and plans to do so again in 2008. This slow recession is similar to the one implemented in 2006 after consultation with the U.S. Army Corps of Engineers determined that it was allowed under existing authority for environmental releases.
7) Falling water levels during the peak of the apple snail egg laying period could result in large mortality of the young snails. Because this species has a one year life cycle, poor

recruitment this year could limit the number of snails available next year for snail kites. Recovery to prior population size could take several years. It is not known to what extent apple snails will be able to take refuge in deeper portions of the lake that still hold water.

8) Hydrilla management has been a chronic problem in Lake Istokpoga. Lowered water levels may stimulate the growth of hydrilla, although it is difficult to predict to what extent the deviation will result in increased growth. Without proper treatment, hydrilla can expand its coverage to levels that will negatively impact the lake.

RECOMMENDATIONS

1) Quantifying benefits and impacts associated with this deviation will be helpful in making decisions about deviations during future droughts. Because this deviation will allow water levels to drop below the elevation that has been proposed for dry years in the Lake Istokpoga Schedule Review, any information from this manipulation of water level could help evaluate that schedule. Stage is already monitored by South Florida Water Management District, water quality by Highlands County and South Florida Water Management District, snail kites by U.S. Fish and Wildlife Service, and fish and wading birds by Florida Fish and Wildlife Conservation Commission. Additional monitoring on the following topics would be especially useful:
    a. Changes in sediment organic matter
    b. Changes in emergent vegetation
    c. Changes in submersed vegetation
    d. Apple snail movement and abundance
    e. Relationship of light extinction to water depth and plant growth
2) Develop and implement a strategy for aggressively managing hydrilla following implementation of the deviation.
3) Coordinate with other agencies and local governments with management responsibilities for Lake Istokpoga. The Florida Department of Environmental Protection and Highlands County are planning a hydrilla treatment in the next few weeks. The Florida Freshwater Fish and Wildlife Conservation Commission is planning habitat improvement activities in the lake, in conjunction with the South Florida Water Management District.
4) Consider planting submersed vegetation to aid recovery from the 2004 and 2005 hurricanes.
5) Communication with the public, businesses and local governments will be important.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
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December 21, 2007

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Service Federal Activity Code:	41420-2006-FA-0940
Service Consultation Code:	41420-2006-F-0681
Date Received:	October 31, 2007
Formal Consultation Initiation Date:	October 31, 2007
Project:	Lake Istokpoga Regulation Schedule Temporary Deviation Extension Request
County:	Highlands

Dear Colonel Grosskruger:

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion based on our review of the U.S. Army Corps of Engineers' (Corps) request for concurrence on a proposed temporary deviation for the Lake Istokpoga regulation schedule, and its effects on the Everglade snail kite (*Rostrhamus sociabilis plumbeus*) in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C. 1531 *et seq.*). A complete administrative record of this consultation is on file in the South Florida Ecological Services Office, Vero Beach, Florida. Acronyms and abbreviations used throughout this letter are listed in Table 1, which follows the end of this letter.

In June 2007, the Corps approved a temporary deviation to Lake Istokpoga's regulation schedule. The South Florida Water Management District (District) requested the deviation to provide water during the late summer to users in the Indian Prairie Water Basin. The deviation would have allowed releases from the lake to meet downstream demands and should have lowered the lake stage to a minimum level of 36.5 feet above sea level. Water shortage planning efforts, regional water conservation measures, and higher than expected rainfall enabled the District to avoid using the deviation. Because of low summer rainfall and low lake stages in Lakes Istokpoga and Okeechobee, this new temporary deviation request seeks to not only extend the period of the previous authorization from the Corps, but also to change the description of the action in anticipation of even lower water levels in 2008, as compared to 2007.

To process the requested deviation from the current regulation schedule, the Corps assessed the effects of the 2007 drought on water levels in Lake Istokpoga, taking into consideration impacts to fish and wildlife, listed species, navigation, and water supply. The proposed deviation is

operational only, and no new construction is planned. The revised schedule would replace the current schedule from its date of approval by the Corps of Engineers until October 1, 2008. Due to the nature of droughts, specifically the level of uncertainty associated with predicting rainfall patterns, if no deviation is granted, then this consultation will become invalid.

The Corps developed three alternatives for the minimum elevation for Zone B. The No-Action alternative (Alt-0) leaves the regulation schedule unchanged. Alternative 1 (Alt-1) would lower the minimum stage in Zone B from 37.5 ft National Geographic Vertical Datum (NGVD) of the current schedule to 35.5 ft. The preferred alternative, Alternative 2 (Alt-2), would lower the minimum stage of Zone B to 36.0 ft. Lowering the minimum stage of Zone B allows releases from Lake Istokpoga to partially meet current downstream water supply demands in the Indian Prairie Basin. The tentatively selected alternative (Alt-2) was identified by the Corps to be the alternative that best met the water supply goal while minimizing ecological damage to the lake's resources.

This Biological Opinion is based on information provided by the District and Corps during weekly teleconferences, in the Corps' Biological Assessments (received October 31 and December 17, 2007), analysis of modeling output, and additional information. The Corps provided a determination of "is likely to adversely affect" the Everglade snail kite. The Corps also determined that "no adverse effect is anticipated" for the Audubon's crested caracara (*Polyborus plancus audubonii*), bald eagle (*Leucocephalus haliaeetus*), or wood stork (*Mycteria americana*) as a result of the action. The Service interprets the Corps' determination of "no adverse effect" to mean "may affect, not likely to adversely affect" under section 7 of the Act. The Service therefore concurs with the Corps' determinations, though it should be noted that the bald eagle is no longer listed as a threatened species under the Act, and therefore is not required to be consulted upon under section 7 of the Act.

There is no critical habitat for the snail kite in Lake Istokpoga. Lake Okeechobee, which lies downstream from Lake Istokpoga, does contain designated critical habitat for the snail kite. Both Lake Istokpoga and Lake Okeechobee are below their respective regulation schedules at this time. The current drought has created adverse conditions in snail kite critical habitat throughout its range. The proposed deviation for Lake Istokpoga is not anticipated to affect the re-establishment of more suitable conditions in Lake Okeechobee when the drought ends, or exacerbate poor conditions downstream. The effects of this project on the species outside of Lake Istokpoga are expected to be only behavioral (movement and distribution of snail kites within their range); effects on critical habitat within any portion of the snail kite's range are anticipated to be discountable.

The Use of Best Scientific and Commercial Information by the Service

The Service uses the most current scientific and commercial information available. The nature of the scientific process dictates information is constantly changing and improving as new studies are completed. The scientific method is an iterative process that builds on previous information. As the Service becomes aware of new information, we will ensure it is fully

considered in our decisions, evaluations, reviews, and analyses as it relates to the base of scientific knowledge and any publications cited in our documents.

Specifically, there is one such document cited in this Biological Opinion that the Service acknowledges has been affected in its cited form by new scientific information. The Service has taken new sources of information into account when using this document to help guide our analysis and decisions. This document is the South Florida Multi-Species Recovery Plan (MSRP) of 1999 (Service 1999).

South Florida Multi-Species Recovery Plan

The MSRP was designed to be a living document and to be flexible to accommodate changes identified through ongoing and planned research, and would be compatible with adaptive management strategies. These principals are set forth in both the transmittal letter from the Secretary of the Interior and in the document itself. As predicted, this has occurred in the intervening years since the MSRP was published. The Service uses the MSRP in the context it still presents useful information when taken in conjunction with all the new scientific information developed subsequent to its publication.

Consultation History

On June 20, 2001, the Service informally consulted on a deviation extension (through July 1, 2001) for the Lake Istokpoga regulation schedule. We evaluated the Corps' determination and concluded that the action was not likely to adversely affect the Everglade snail kite, wood stork, bald eagle or Audubon's crested caracara. We also found that the action would not destroy or adversely modify snail kite critical habitat. At that time, snail kites were not known to be nesting on Lake Istokpoga.

On April 1, 2004, the Service informally consulted on a temporary deviation from the water regulation schedule for Lake Istokpoga. The deviation request was to delay the drop in lake stage from March 1 to May 15, 2004. The request would allow more effective treatment of hydrilla (*Hydrilla verticillata*) by the Florida Department of Environmental Protection (FDEP). We agreed with the Corps' determination of no effect on Everglade snail kite, wood stork, Audubon's crested caracara, and bald eagle. Similar to the previous consultation, snail kites were not known to be nesting on Lake Istokpoga in 2004.

On May 18, 2007, the Service issued a Biological Opinion to the Corps on their request for a temporary deviation to the Lake Istokpoga regulation schedule. The request was for a "gradual decline over the next 45 days to a deviated floor elevation of 36.5 ft National Geodetic Vertical Datum (NGVD) by 15 May 2007." The deviated floor elevation would remain at 36.5 ft until August 31, 2007. Beginning on September 1, 2007, the deviation line would then gradually increase and intercept the existing regulation schedule of 39.0 ft by mid October 2007. The Biological Opinion authorized the take of up to13 adult kites in the forms of harm and harassment as it related to a reduction in foraging opportunities in Lake Istokpoga for 2007. In

actuality, the deviation was never implemented because 2007 summer rainfall was adequate to meet water supply needs without altering the lake's regulation schedule.

In early October 2007, the Service was notified that the District was requesting an extension to the deviation, due to an expected water shortage over the 2007-2008 dry season. Urgent coordination with all resource agencies was requested in the District's email.

Beginning on or about October 22, 2007, the Service began to participate in a series of weekly conference calls to discuss the status of the Istokpoga deviation request and the potential effects of the drought on snail kites.

On October 29, 2007, the Service received an "Updated Assessment of Ecological Impacts on Lake Istokpoga of a Proposed Extension of the Deviation to the Regulation Schedule", prepared by the District and forwarded to the Service via email by the Corps. This document provided in-depth descriptions of the proposed action, existing conditions, and an analysis of the effects of the action on lake ecology, water supply and other social and economic concerns.

On October 31, 2007, the Service received the District's second temporary deviation request via fax from the Corps. In that letter, the deviation request outlined two alternatives: the no action alternative, and the deviation alternative, which would lower the minimum elevation of Zone B to 35.5 ft. Attached to this letter was the Corps' Biological Assessment that provided an effect determination of "likely to adversely affect" the Everglade snail kite. The Corps also determined that "no adverse effect is anticipated" for the Audubon's crested caracara, bald eagle, or wood stork as a result of the action. The Service agrees with the Corps' determinations.

During the November 5 conference call, the Service asked the team to evaluate a compromise alternative where the simulated lake stage would be predicted to drop to a minimum of 36.0 ft rather than 35.5 ft as simulated in the proposed deviation. Our preliminary analysis of the deviation request showed that a lowering of lake stage to 35.5 ft for several months may impact the apple snail population in the lake to a degree that would adversely affect snail kite breeding on Lake Istokpoga for several years in the future. The Service believes that dropping the lake to only 36.0 ft may lessen the impact to the snails.

During the November 9 conference call, the District provided graphs depicting two scenarios that dropped the simulated lake stage to no lower than 36.0 ft. These two scenarios were developed by either altering the deviation line or the percentage of cutbacks to water users. The District performed these analyses at our request, but stated that they would not submit them to the Corps as official project alternatives for the Corps to analyze during their National Environmental Policy Act review.

Several telephone meetings were conducted in late November and early December between the upper management of the Service, Corps and District in order to agree upon a compromise alternative that would allow the District to provide some drought relief to water users, and still provide minimal protection to the snail kite.

During the December 17, 2007, conference call, the District indicated it was unwilling to change its original proposal to deviate from the regulation schedule, but that the Corps would add an additional alternative to their NEPA analysis. This new alternative would lower Zone B to 36.0 ft, and it would be presented within their Environmental Assessment as the preferred alternative.

The revised Biological Assessment and revised request for concurrence were received by the Service via email on December 17, 2007.

The Service has reviewed all information received pertinent to the Everglade snail kite for the proposed Lake Istokpoga regulation deviation request and concurs with the Corps' determination that this proposed project "may affect and is likely to adversely affect" the Everglade snail kite. The Service is providing this Biological Opinion in conclusion of formal consultation.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

Proposed action

The Corps proposes to grant the District a temporary deviation of the existing regulation schedule for Lake Istokpoga for the purpose of water supply for the northern and southern portions of the Indian Prairie Water Use Basin. One of the water users in this basin is the Seminole Tribe of Indians of Florida at the Brighton Reservation. In 1987, the Seminole Tribe of Florida, the District, and the State of Florida entered into a Water Rights Compact. Both Congress and the Florida Legislature adopted the Compact as state and Federal law.

The Corps analyzed two variations of the deviation and a no-action scenario. The two alternatives for the deviation alter the lower boundary of Zone B of the regulation schedule. Assuming all other factors (precipitation, evapotranspiration) remain constant in our analysis, the only human intervention significantly affecting water levels during the drought is the allocation of water supply, which is in the jurisdiction of the District. It is our understanding that the percentage of water supply cutbacks is not a fixed number, and can be adjusted over the period of the deviation and for different water users, in order to best control the lake stage.

The existing regulation schedule for Lake Istokpoga is the no-action alternative, or Alternative 0 (Alt-0) (Figure 1). Alternative 1 (Alt-1) is the deviation originally proposed by the District, which lowers the minimum stage of Zone B from 37.5 ft NGVD to 35.5 ft. Alternative 2 (Alt-2) would lower the minimum stage in Zone B from 37.5 ft NGVD to 36.0 ft (Figure 2). Lowering the minimum stage in Zone B would allow limited water releases from Lake Istokpoga to partially meet downstream water supply demands in the Indian Prairie Basin if the drought continues. Alt-2 was identified by the Corps to be the preferred alternative, and is therefore the subject of this consultation. In reaching this decision, the Corps weighed a variety of potential impacts, including anticipated water supply needs of the Indian Prairie Basins, the water levels in Lake Istokpoga and Lake Okeechobee, predicted rainfall patterns, potential navigation impacts, and potential ecological effects, in particular, the effects of the proposed action on the

endangered Everglade snail kite. In selecting Alt-2 as the preferred alternative, in our opinion, there is an inherent assumption that appropriate levels of water supply cutbacks will be imposed to prevent the lake stage from dropping below 36.0 ft. Given the uncertainties of the predictions of the trajectory of the drought, such cutback decisions must be made on a continuous basis throughout the drought.

When the water levels in Lake Okeechobee drop below 10 ft NGVD (which they did from late April to early October 2007), it can no longer supply water to the southern Indian Prairie Basin. Lake Istokpoga then becomes the primary water source for the entire Indian Prairie Basin. When this occurs, there is an automatic change of the minimum elevation of Zone B in Lake Istokpoga from 37.5 ft to 37.0 ft (Figure 1). This may have important ramifications for both the potential need for the granting of a deviation and the timing for which a deviation could be issued and still allow the District to meet the non-deviated regulation schedule.

Currently, both the northern and southern Indian Prairie Basins are in Phase III water restrictions. Because Lake Istokpoga is currently below schedule, no direct water withdrawals are being allowed from the lake.

The development, assessment, and selection of alternatives under consideration by the Corps were based on model simulations provided to them by the District. These simulations modeled current water restrictions, water usage permits, existing lake levels, evapotranspiration rates, groundwater flows into the lake from the Lake Wales Ridge, and the time until significant rain is likely. The model predicts the changes in lake volume by subtracting losses based on estimated water supply allocations and daily evapotranspiration. The simulation assumes that there is no rainfall, tributary inflows, or groundwater seepage into the lake. Thus, the resulting recession is conservative in the sense that any water inputs to the lake would result in a slower recession rate. Tributary inflows have decreased since the end of the rainy season, but continued rainfall in the early dry season has kept the lake stage from dropping as quickly as originally estimated. A position analysis performed on December 14, 2007 began with a lake stage of 0.5 ft higher than a similar analysis conducted for the original deviation request from 6 weeks earlier.

The proposed deviation to the regulation schedule for Lake Istokpoga would alter the lower limit for Zone B, where water supply releases would cease, to 36.0 ft beginning the first week of May to the middle of July, 2008. Lowering the minimum stage in Zone B would allow releases from Lake Istokpoga to continue for downstream water supply demands in the Lake Istokpoga/Indian Prairie Basin (District 2007). The combination of lowering Zone B and adjusting the percentage of water supply cutbacks would result in a simulated lake stage that does not drop below 36.0 ft.

In the current regulation schedule, the Zone B line decreases from 39 ft in mid-October at a variable rate to a low of 37 feet by May 1 (if the pumps adjacent to S-71 [G-207] and S-72 [G-208] are inoperable), then remains at 37 ft until June 30, and eventually increases at a variable rate to 39 ft by mid-October. In contrast, the Zone B (proposed) line for the temporary deviation would drop to 38 ft on November 16 (this date has already passed). It would follow a gradual decrease to 37.18 ft on March 16 and then would experience a more rapid decrease to 36.0 ft on May 8. It would remain at 36.0 ft until July 17 and then begin to increase and

approach the normal Zone B regulation line by September 30. If the proposed deviation is granted, the changes in lake stage under the deviation regulation schedule will depend on the quantity of rainfall over the basin, the resulting groundwater and surface water inflows, and the demands by downstream water users (District 2007).

Action area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. It encompasses the geographic extent of environmental changes (*i.e.*, the physical, chemical and biotic effects) that will result directly and indirectly from the action. The action area for this Biological Opinion is the state-wide range of the Everglade snail kite. This Biological Opinion describes a nomadic species that can move among various wetland habitats in central and south Florida. Although the proposed action is not deemed to have direct or indirect effects on habitat conditions in other portions of the species' range such as Lake Okeechobee, the Kissimmee Chain of Lakes, St. Johns Marsh, Grassy Waters Preserve, or the Water Conservation Areas, it may have direct or indirect impacts on the behavior of the species as it relates to movement and nesting behavior in the other snail kite breeding areas.

Lake Istokpoga measures 11,200-hectares (27,692 acres) in area. It is the fifth largest natural lake in Florida. The lake is generally shallow, averaging only 4 to 6 feet in depth. The major tributaries to Lake Istokpoga are Josephine Creek and Arbuckle Creek, which are located in the northwest and north areas of the lake, respectively. Water can be discharged from the Lake through two major outlets: the Istokpoga canal that flows towards the Kissimmee River and the S-68 Structure that controls water flow to a series of canals that lead to both Lake Okeechobee and the Kissimmee River. Lake water levels are lowered prior to the summer rainy season to provide water storage for flood control. Levels are held higher during the winter-spring dry season for water supply. Lake Istokpoga is the largest single source of permitted surface water in the Kissimmee Valley. The reduction of high lake levels (since 1962) has provided the catalyst for development around the shores of the lake, including agriculture (citrus and caladium farms), pasture land, and residential and commercial establishments. Many areas adjacent to the lake that once flooded seasonally or infrequently are now drained.

The lake is divided into three zones: littoral, nearshore, and pelagic. The littoral zone is defined as that area in the lake that extends from the shoreline into the lake to a bottom elevation of 36 ft NGVD. It is approximately 5,986 acres in size. This area is occupied by emergent and submerged aquatic vegetation and some exotic aquatic plants. This area is also negatively impacted by an abundance of floating mats of vegetation referred to as "tussocks." The nearshore zone is defined as the area of the lake that occupies the bottom elevations from 36 ft to 34 ft. It is approximately 7,045 acres in size. This area is sparsely vegetated. The pelagic zone is the remainder of the lake (*i.e.*, the interior-most portion) at bottom elevations less than 34 ft. It is approximately 14,661 acres in size. This area is negatively affected by exotic plant growth (primarily hydrilla), and receives routine herbicide treatment.

STATUS OF THE SPECIES

Species Description

The Everglade snail kite is one of three subspecies of snail kite, a wide-ranging New World raptor found primarily in lowland freshwater marshes in tropical and subtropical America from Florida, Cuba, and Mexico south to Argentina and Peru. The Everglade subspecies occurs in Florida and Cuba, though only the Florida population is listed. The Florida population was first listed under the Endangered Species Preservation Act in 1967, and protection was continued under the Endangered Species Conservation Act of 1969. The Everglade snail kite, and all other species listed under the Endangered Species Conservation Act were the first species protected under the Act of 1973, as amended, and all of these species were given the 'endangered' status.

The snail kite is a medium-sized raptor, with a total body length for adult birds of 14 to 15.5 inches and a wingspan of 43 to 46 inches (Sykes et al. 1995). In both sexes, the tail is square-tipped with a distinctive white base that appears as a white patch on the rump when in flight. The wings are broad, long, and paddle-shaped and are held bowed downward or cupped when in flight (Sykes et al. 1995). Adults of both sexes have red eyes and juveniles have brown eyes (Brown and Amadon 1976; Clark and Wheeler 1987). The plumage is markedly different among adult male, adult female, and juvenile birds. Adult males have a uniformly slate gray plumage, and adult female plumage is brown dorsally and pale white to cream ventrally, with dark streaking on the breast and belly (Sykes et al. 1995). Immature kites are similar in appearance to adult females but are more cinnamon-colored, with tawny or buff-colored streaking rather than brown streaking. Females are slightly larger than males. The slender, decurved bill is an adaptation for extracting the kite's primary prey, the apple snail; the bill is a distinguishing character for field identification in both adults and juveniles.

Life History

Everglade snail kites are dietary specialists, a relatively rare foraging strategy among raptors. The Florida apple snail (*Pomacea paludosa*) is the kite's principal prey in Florida, and makes up the great majority of the kites' diet (Sykes 1987a; Kitchens et al. 2002). Throughout the range of all subspecies of snail kites, *Pomacea* snails consistently compose the primary prey of snail kites (Sykes 1987a; Beissinger 1990) and kites possess several unique adaptations that allow them to efficiently capture, extract, and consume *Pomacea* snails (*e.g.,* the slender, deeply hooked sharp-tipped bill that allows kites to efficiently extract snails from their shells, long slender toes that allow kites to grasp large snails) (Sykes et al. 1995; Beissinger 1990). Under normal conditions, Everglade snail kites are nearly completely dependent on apple snails as prey. However, other prey items have been documented. Beissinger (1990) reported that kites captured and consumed small turtles such as the musk turtle (*Sternotherus odoratus*) and mud turtles (*Kinosternon* spp), and they captured and consumed another type of small freshwater snail (*Viviparus georgianus*). Other prey that have been occasionally documented include crayfish (*Procambarus* spp.), speckled perch (*Pomoxis nigromaculatus*), and small snakes (Sykes et al. 1995).

Several species of non-native apple snails have become established recently within limited areas of Florida and have been used to varying degrees by snail kites. Takekawa and Beissinger (1983) reported kite use of the non-native *Pomacea bridgesii*, and snail kites now regularly forage on a relatively newly-arrived non-native apple snail species that currently occurs at high densities within Lake Tohopekaliga, Osceola County, Florida (Kitchens 2006). This snail species was initially suspected to be *Pomacea canaliculata*, but recent research suggests that it is *Pomacea haustrom* (Collins and Rawlings 2006). Despite the use of these other species for foraging, all available evidence suggests that snail kites are still primarily dependent on Florida apple snails. Beissinger (1990) reported that use of turtles and other snail species occurred primarily during periods of limited prey availability such as drought conditions or cold spells. The specializations that allow the snail kite to so efficiently capture and extract apple snails make it difficult for them to capture and eat other alternative prey items (Beissinger 1990). The snail kite may be relatively well-adapted to capture and consume non-native *Pomacea* species, but preliminary information suggests that snail kites may only be able to successfully extract the flesh from a small portion of the presumed *P. haustrom* due to their large size. Juvenile kites that are reliant on these non-native snails may not be able to sustain themselves, despite the fact that snails are abundant (Kitchens 2006). The close tie between the Everglade snail kite and the Florida apple snail requires consideration of both species when developing management strategies and addressing potential impacts.

Everglade snail kites and their primary prey are both wetland-dependent species that rely on wetland habitats for all aspects of their life history. The primary wetland habitat types upon which kites rely consist of freshwater marshes and the shallow vegetated littoral zones along the edges of lakes (natural and man-made) where apple snails occur in relatively high abundance and can be found and captured by kites.

Snail kites use two visual foraging methods: course-hunting, while flying 5 to 33 ft above the water surface, or still-hunting from a perch (Sykes 1987a; Sykes et al. 1995). While course-hunting, the flight is characterized by slow wing beats, alternating with gliding; the flight path is usually into the wind, with the head oriented downward to search for prey. Snails are captured with the feet at or below the surface, to a maximum reach of about 6 inches below the surface. Snail kites do not plunge into the water to capture snails and never use the bill to capture prey. Individuals may concentrate hunting in a particular foraging site, returning to the same area as long as foraging conditions are favorable (Cary 1985). Capture rates are higher in summer than in winter (Cary 1985), with no captures observed at a temperature less than 10°C (50°F). Snail kites frequently transfer snails from the feet to the bill while in flight to a perch. Feeding perches include living and dead woody-stemmed plants, blades of sawgrass and cattails, and fence posts.

While kites are capable of foraging successfully under a variety of habitat conditions, the preferred foraging habitat is typically a combination of relatively short-stature, sparse graminoid marsh vegetation less than 6.5 ft (2 meters) in height. The apple snail requires emergent aquatic plants to provide substrate that allows them to reach the water surface to breathe. However, for kites to feed, the emergents must be sparse enough that they are capable of locating and capturing snails (Kitchens et al. 2002). Marshes and lake littoral zones composed of interdigitated areas of open water 0.6 to 4.3 ft deep which is relatively clear and calm and

patches of herbaceous emergent wetland plants or sparse continuous growth of herbaceous wetland plants generally provide the appropriate balance of emergent vegetation and open water (Sykes et al. 1995; Kitchens et al. 2002). Marsh species that commonly occur within favorable kite foraging habitat include spike rush (*Eleocharis cellulosa*), maidencane (*Panicum hemitomon*), sawgrass (*Cladium jamaicense*), bulrush (*Scirpus* spp.), and/or cattails (*Typha* spp.). Shallow open-water areas may also contain sparse cover of species such as white water lily (*Nymphaea odorata*), arrowhead (*Sagittaria lancifolia*), pickerel weed (*Pontederia lanceolata*), and floating heart (*Nymphoides aquatica*). Periphyton growth on the submerged substrate provides food source for apple snails, and submergent aquatic plants such as bladderworts (*Utricularia* spp.) and eelgrass (*Vallisneria* spp) may contribute to favorable conditions for apple snails while not preventing kites from detecting snails (Sykes et al. 1995).

Foraging habitat conditions that differ substantially from those described above will result in either reduced apple snail density or reduced ability of snail kites to locate and capture snails. Vegetation cover that is either too dense or too sparse can result in reduction in the quality of the area as foraging habitat.

The Everglade snail kite breeding season in Florida varies from year to year and is probably affected by rainfall and water levels (Sykes et al. 1995). Ninety-eight percent of the nesting attempts are initiated from December through July, while 89 percent are initiated from January through June (Sykes 1987c; Beissinger 1988; Snyder et al. 1989), with the peak in nest initiation occurring from February to April (Sykes 1987c). Snail kites often renest following failed attempts early in the season, as well as after successful attempts (Beissinger 1986; Snyder et al. 1989), but the actual number of clutches per breeding season is not well documented (Sykes et al. 1995).

Pair bonds are established prior to egg-laying and are relatively short, typically lasting from nest initiation through most of the nestling stage (Beissinger 1986, Sykes et al. 1995). Male kites select nest sites and conduct most nest-building, which is probably part of courtship (Sykes 1987c; Sykes et al. 1995). Unlike most raptors, snail kites do not defend large territories and frequently nest in loose colonies or in association with wading bird nesting colonies (Sykes 1987b; Sykes et al. 1995). Kites actively defend small territories extending about 4 miles around the nest (Sykes 1987b). Copulation can occur from early stages of nest construction, through egg-laying, and during early incubation if the clutch is not complete. Egg-laying begins soon after completion of the nest, but may be delayed a week or more (Sykes 1987c). An average 2-day interval between laying each egg results in the laying of a three egg clutch in about 6 days (Sykes et al. 1995). The clutch size ranges from 1 to 5 eggs, with a mode of three (Sykes 1987c; Beissinger 1988; Snyder et al. 1989). Incubation may begin after the first egg is laid, but generally after the second egg (Sykes 1987c). In Florida, the incubation period lasts 24 to 30 days (Sykes 1987c). Incubation is shared by both sexes, but the contribution of incubation time between the male and female is variable (Beissinger 1987). Hatching success is variable from year to year and between areas. In nests where at least one egg hatched, hatching success averaged 2.3 chicks per nest (Sykes 1987c).

After hatching, both parents initially participate in feeding young, but there is variability in the contribution of each member of the pair (Beissinger 1987). The nestling period lasts about 23 to 34 days and fledging dates may vary by 5 days among chicks (Sykes et al. 1995). Following fledging, young are fed by one or both adults until they are 9 to 11 weeks old (Beissinger 1987). In total, snail kites have a nesting cycle that lasts about 4 months from initiation of nest-building through independence of young (Beissinger 1986; Sykes et al. 1995).

Snail kites also have a relatively unique mating system in Florida that is described as ambisexual mate desertion, in which either the male or female may abandon nests part way through the nestling stage (Beissinger 1986, 1987). This behavior appears to occur primarily under conditions when prey is abundant, and it may be an adaptation to maximize productivity during favorable conditions. Following abandonment, the remaining parent continues to feed and attend chicks through independence (Beissinger 1986). Abandoning parents presumably form new pair bonds and initiate a new nesting attempt. Snail kites mature early compared to other raptors and can breed successfully the first spring after they hatch, when they are about 8 to 10 months old. However, not all kites breed at this age. Bennetts et al. (1998) reported that only three out of nine first-year snail kites attempted to breed, while all of 23 adults that were tracked attempted to breed. Of the 23 adult kites, 15 attempted to breed once, 7 attempted to breed twice, and one individual attempted to breed three times. Only one adult kite successfully fledged two clutches. Adult kites generally attempt to breed every year with the exception of drought years when some kites may not attempt to nest (Sykes et al. 1995).

Nesting almost always occurs over water, which deters predation (Sykes 1987b). An important feature for snail kite nesting habitat is the proximity of suitable nesting sites to favorable foraging areas. Thus, extensive stands of contiguous woody vegetation are generally unsuitable for nesting and suitable nest sites consist of single trees or shrubs or small clumps of trees and shrubs within or adjacent to an extensive area of suitable foraging habitat. Trees usually less than 32 ft tall are used for nesting, and include willow (*Salix* spp.), bald cypress (*Taxodium distichum*), pond cypress (*Taxodium ascendens*), *Melaleuca quinquenervia*, sweetbay (*Magnolia virginiana*), swamp bay (*Persea borbonia*), pond apple (*Annona glabra*), and dahoon holly (*Ilex cassine*). Shrubs used for nesting include wax myrtle (*Myrica cerifera*), cocoplum (*Chrysobalanus icaco*), buttonbush (*Cephalanthus occidentalis*), *Sesbania* sp., elderberry (*Sambucus simpsonii*), and Brazilian pepper (*Schinus terebinthifolius*). Nesting also can occur in herbaceous vegetation, such as sawgrass (*Cladium jamaicense*), cattail (*Typha* sp.), bulrush (*Scirpus* sp.), and reed (*Phragmites australis*) (Sykes et al. 1995). Nests are more often observed in herbaceous vegetation around Lake Kissimmee and Lake Okeechobee during periods of low water when dry conditions beneath the willow stands (which tend to grow to the landward side of the cattails, bulrushes, and reeds) prevent snail kites from nesting in woody vegetation. Nests constructed in herbaceous vegetation on the waterward side of the lakes' littoral zone are more vulnerable to collapse due to the weight of the nests, wind, waves, and boat wakes and are more exposed to disturbance by humans (Chandler and Anderson 1974; Sykes and Chandler 1974; Sykes 1987b; Beissinger 1986, 1988; Snyder et al. 1989).

Adult snail kites have relatively high annual survival rates, with estimated average rates ranging from 85 to 98 percent (Nichols et al. 1980; Bennetts, Dreitz et al. 1999; Martin et al. 2006).

Adult survival is probably reduced in drought years (Takekawa and Beissinger 1989; Martin et al. 2006). Adult longevity records in the wild are more than 15 years, and kites may frequently live longer than 13 years in the wild (Sykes et al. 1995).

Everglade snail kites may roost communally outside of breeding season, and occasionally roost in groups of up to 400 or more individuals (Bennetts et al. 1994). Roosting sites are also usually located over water. On average, in Florida, 91.6 percent are located in willows, 5.6 percent in *Melaleuca*, and 2.8 percent in pond cypress. Roost sites are in taller vegetation among low-profile marshes. Snail kites tend to roost around small openings in willow stands at a height of 5.9 to 20.0 ft, in stand sizes of 0.05 to 12.35 acres. Roosting also has been observed in *Melaleuca* or pond cypress stands with tree heights of 13 to 40 ft (Sykes 1985).

Snail kites are considered nomadic, and this behavior pattern is probably a response to changing hydrologic conditions (Sykes 1979). During breeding season, kites remain close to their nest sites until they fledge young or fail. Following fledging, adults may remain around the nest for several weeks, but once young are fully independent adults may depart the area. Outside of the breeding season, snail kites regularly travel long distances within and among wetland systems in southern Florida (Bennetts and Kitchens 1997). While most movements may be in response to droughts or other unfavorable conditions, kites may also move away from wetlands when conditions appear favorable. Movements within large wetlands and movements among adjacent wetland units occurred frequently, while movements among spatially isolated wetlands occurred less frequently (Martin et al. 2006). Fledgling kites also move frequently, but are more likely to move to immediately adjacent wetland units than adults, and this may indicate a degree of familiarity with the availability of wetlands across the landscape that adult kites acquire through experience.

Snail kites are gregarious. In addition to nesting in loose colonies and roosting communally in large numbers, kites may also forage in common areas in proximity to other foraging kites.

Population Dynamics

From a demographic perspective, Everglade snail kites appear to exhibit high levels of variability in some demographic parameters, while others remain relatively constant. For example, distribution of nesting appears to fluctuate dramatically among years. Similarly, productivity appears to be highly variable and heavily influenced by environmental conditions (Sykes 1979; Beissinger 1989, 1995; Sykes et al. 1995). Duration of breeding season and amount of double- or triple-brooding are also variable (Beissinger 1986). Juvenile survival also appears to be highly variable among years (Beissinger 1995; Bennetts and Kitchens 1999; Martin et al. 2006). In contrast, adult survival appears to be relatively constant over time at a relatively high level (Bennetts, Dreitz et al. 1999; Martin et al. 2006), though drought years may result in reduced adult survival (Beissinger 1995; Martin et al. 2006). The combination of these demographic characteristics may allow kites to survive unfavorable conditions, by either moving to other areas or simply waiting out the unfavorable conditions. Under favorable environmental conditions, kites have the ability to achieve high reproductive rates (Beissinger 1986), and similarly, juvenile survival rates appear to be higher under more favorable conditions.

Relatively large fluctuations in the Everglade snail kite population size have been widely reported and generally attributed to environmental conditions (Beissinger 1986; Beissinger 1995). However, some of these reported fluctuations and the magnitude of reported declines in particular, may be influenced by the population survey methods (see below) and the fact that kites tend to depart traditional areas when those areas experience unfavorable conditions (Bennetts, Link et al. 1999).

Historic records of snail kite nesting include areas as far north as Crescent Lake and Lake Panasoffke in north-central Florida and as far west as the Wakulla River (Howell 1932; Sykes 1984). Several authors (Nicholson 1926; Howell 1932; Bent 1937) indicated that the snail kite was numerous in central and southern Florida marshes during the early 1900s, with groups of up to 100 birds. Reports of snail kite population declines in the 1940s and 1950s suggested that as few as 6 to 100 individuals remained (Sykes 1979). Reports of declines resulted from disappearance of kites from areas where they had previously occurred in large numbers, including Lake Okeechobee and the headwaters of the St. John's marsh (Sykes 1979). Limited resources were available at that time for researchers to reach potential snail kite habitats, the resulting low level of survey effort may have biased these low snail kite population estimates, and absence of kites from particular areas may have resulted from the kite's nomadic behavior and responses to unfavorable hydrologic conditions (Sykes 1979). However, there is little doubt that the snail kite was endangered at that time and that its range had been dramatically reduced.

When the snail kite was listed as endangered in 1967 (Service 1967), the species was considered to be at an extremely low population level. In 1965, only 10 birds were found, 8 in WCA-2A and 2 at Lake Okeechobee. A survey in 1967 found 21 birds in WCA-2A (Stieglitz and Thompson 1967).

Prior to 1969, the snail kite population was monitored only through sporadic and inconsistent surveys (Sykes 1979, 1984). From 1969 to 1994, an annual quasi-systematic mid-winter snail kite count was conducted by a succession of principal investigators. Counts since 1969 have ranged from 65 in 1972 to 996 in 1994. Bennetts et al. (1993, 1994) cautioned that the 1993 and 1994 counts were performed with the advantage of having numerous birds radio-tagged. This influenced the total count, because radio-tagged birds could be easily located and often led researchers to roosts that had not been previously surveyed. Bennetts and Kitchens (1997) identified issues with the count surveys and recommended that they should not be the basis of population estimates or used to infer demographic parameters such as survival or recruitment. Bennetts, Link et al. (1999) analyzed these counts and the sources of variation in these counts and determined that count totals were influenced by observer differences, differences in hydrologic conditions and effort, and site effects. While significant sources of error were identified, these data could provide a crude indication of trends, if all influences of detection rates had been adequately taken into account. The sources of variation in the counts should be recognized prior to using these data in subsequent interpretations, especially in attempting to determine population viability and the risk of extinction.

Although sharp declines have occurred in the counts since 1969 (for example, 1981, 1985, 1987), it is unknown to what extent this reflects actual changes in population. Rodgers et al. (1988) have stated that it is unknown whether decreases in snail kite numbers in the annual count are due to mortality, dispersal (into areas not counted), decreased productivity, or a combination of these factors. Despite these problems in interpreting the annual counts, the data since 1969 have indicated a generally increasing trend (Sykes 1979; Rodgers et al. 1988; Bennetts et al. 1994). While acknowledging the problems associated with making year-to-year comparisons in the count data, some general conclusions are apparent. Changes in occurrence and occupancy of individual wetland units are variable among years and the degree of variability among wetlands is also variable. For example, Lake Okeechobee seems to retain some suitable snail kite habitat throughout both wet and dry years and remained relatively continuously occupied from 1969 through the mid-1980s. In contrast, snail kite use of WCAs fluctuates greatly, with low use during drought years, such as 1991, and high use in wet years, such as 1994.

Refined population estimates were generated for the Everglade snail kite using a mark-recapture method beginning in 1997 (Dreitz et al. 2002). These new population estimates which explicitly address detection probability and incorporate corrections to exclude the effects of variable detection probability that affected previous population estimates are higher than those resulting from the previous counts. The population size estimate generated from mark-recapture estimates for 1997-2000 was about 2 to 3 times higher than count-based estimates (estimates of about 800 to 1,000 individuals in 1993 and 1995 based on count-based surveys compared to about 2,700 to 3,500 estimated from mark-recapture analyses from 1997 to 2000) (Bennetts and Kitchens 1997; Dreitz et al. 2002). Confidence intervals can also be generated for population estimates generated using the new method, which increases the validity of comparing population estimates among years.

Since 1997, population estimates and estimates of demographic parameters have been generated exclusively employing mark-recapture methods that incorporate detection probabilities. From 1997 through 1999, the snail kite population was estimated to be about 3,000 birds (Dreitz et al. 2002). From 1999 through 2002, the population estimates declined each year until they reached a low level of about 1,400 birds in 2002 and 2003, then increased slightly to about 1,700 birds in 2004 and 2005 (Martin et al. 2006). A preliminary estimate of the 2006 snail kite population size is about 1,600 birds.

The state-wide snail kite population declined from 1999 to 2003 (Figure 3), and may have been exacerbated by a regional drought that affected southern Florida during 2000 to 2001. During this period, nest success was generally low (Martin et al. 2006), and demographic parameters estimated from mark-recapture methods also indicated that juvenile survival rates were low, and even adult survival declined during 2001 (Figure 4) (Martin et al. 2006). However, following the end of the drought conditions in 2002 and a return to normal or wetter-than-normal hydrologic conditions from 2002 to 2006 that generally provide favorable snail kite nesting conditions, population estimates remained low, and nest success and juvenile survival rates also remained low (Martin et al. 2006).

South Florida experienced another intense and widespread drought in 2007 covering the entire range of the Everglade snail kite. The majority (approximately 80%) of observed nesting occurred in the Kissimmee Chain of Lakes, especially Lake Tohopekaliga, with few nests observed in the WCAs, Lake Okeechobee, St. Johns Marsh, or Grassy Waters (Table 2). This apparent shift of the breeding population to the northern lakes suggests a level of adaptability and resilience in the population in response to the severe stress of the drought. Preliminary data from 2007 monitoring efforts indicate an overall lower number of active nests but higher nest success than in recent years, with over 95 percent of successful nests occurring in the Kissimmee Chain of Lakes (Table 3). Two successful nests occurred in Lake Istokpoga, while no successful nesting occurred in the WCAs, Lake Okeechobee, or other monitored areas. Additional data and analyses to estimate productivity and adult and juvenile survival are needed, as well as 2007 population estimates using mark-recapture techniques, to provide information on the effect of this year's drought on the snail kite population. In addition to potential effects of the drought on snail kites, it will also be interesting to observe how quickly apple snails can return after the drought to an abundance that will support successful kite nesting in Lake Okeechobee and the other major wetland complexes essential to the species.

Status and Distribution

The subspecies *R. s. plumbeus* occurs in Florida, Cuba (including Isla de la Juventud) and northwestern Honduras. There is no evidence of movement of birds between Cuba and Florida, but this possibility has not been ruled out (Sykes 1979; Beissinger et al. 1983). In Florida, the historic range of the snail kite was larger than at present.

The current distribution of the snail kite in Florida is limited to central and southern portions of the State. Six large freshwater systems are located within the current range of the snail kite: Upper St. Johns marshes, Kissimmee Chain of Lakes, Lake Okeechobee, Loxahatchee Slough, the Everglades, and the Big Cypress basin (Beissinger and Takekawa 1983; Sykes 1984; Rodgers et al. 1988; Bennetts and Kitchens 1997; Rumbold and Mihalik 1994; Sykes et al. 1995). Habitats that support snail kites in the Upper St. Johns drainage include the East Orlando Wilderness Park, the Blue Cypress Water Management Area, the St. Johns Reservoir, and the Cloud Lake, Strazzulla, and Indrio impoundments with most current nesting occurring within the Blue Cypress Water Management Area (Martin et al. 2006). In the Kissimmee Chain of Lakes, snail kites may occur within most of the lakes and adjacent wetlands, with the majority of kite nesting occurring within Lake Kissimmee, Lake Tohopekaliga, and East Lake Tohopekaliga. Lake Okeechobee and surrounding wetlands historically supported significant snail kite nesting and foraging habitats. Most of the recent nesting in Lake Okeechobee has occurred within the expansive marsh in the southwestern portion of the lake and the area southwest of the inflow of the Kissimmee River (Martin et al. 2006). In the Loxahatchee Slough region of Palm Beach County, snail kites may occur throughout the remaining marshes in the vicinity and most frequently nest within Grassy Waters, which is also known as the West Palm Beach Water Catchment Area. Kites may occur within nearly all remaining wetlands of the Everglades region, with recent nesting occurring within WCA-2B, WCA-3A, WCA-3B, and ENP (Martin et al. 2006). Within the Big Cypress basin, snail kites may occur within most of the non-forested

and sparsely forested wetlands. Nesting has not been regularly documented in this area in recent years, though some nesting likely occurs.

In addition to the primary wetlands where most kite nesting has been documented, there are numerous records of kite occurrence and/or nesting within isolated wetlands throughout the region. The Savannas State Preserve, in St. Lucie County, the Hancock impoundment in Hendry County, and Lehigh Acres in Lee County are among the smaller more isolated wetlands used by snail kites (Sykes et al. 1995). Takekawa and Beissinger (1989) identified numerous wetlands that they considered drought refugia which may provide kite foraging habitat when conditions in the larger more traditionally occupied wetlands are unsuitable. Although the above list generally describes the current range of the species, radio tracking of snail kites has revealed that the network of habitats used by the species includes many smaller, widely dispersed wetlands within this overall range (Bennetts and Kitchens 1997). Snail kites may use nearly any wetland within southern Florida under some conditions and during some portions of their life history. However, the majority of nesting continues to be concentrated within the large marsh and lake systems of the Greater Everglades and the Upper St. John's marshes.

While it is not possible to compare the current population size to those recorded from the 1970s through 1997 due to differences in sampling methods, several lines of evidence suggest that the current kite population has declined and may be continuing to decline. Martin et al. (2006) reported that the population has declined by about 50 percent and their estimates result from consistent methods. In addition, the distribution of nesting activity in recent years has suggested that several of the traditional nesting areas were in unfavorable conditions for nesting. Low productivity, both in terms of low rates of nest initiation and low success rates resulting from those initiated nests suggest that conditions were poor for kite nesting in those years. Relatively low juvenile survival rates in recent years also support the conclusion that conditions for kites have been relatively unfavorable due to a variety of factors. There has, however, been the expected annual variation in juvenile survival estimates, with 2002-2004 showing comparatively high rates since 2000.

Studies of apple snail abundance and occurrence within traditional snail kite nesting areas also support conclusions that foraging conditions may be poor. Darby et al. (2005) reported that apple snail abundance has recently declined substantially within WCA-3A. Darby (2005a, 2005b) reported that apple snail abundance remains relatively low in areas of traditional snail kite use within Lakes Kissimmee, Tohopekaliga, and Okeechobee in recent years.

As previously noted, however, adult survival has been relatively constant over time at a relatively high level (Bennetts, Dreitz et al. 1999; Martin et al. 2006), except in 2001 and 2002. This factor may help kites survive unfavorable conditions, and because the adults can either move to other areas with more favorable conditions or simply wait out the unfavorable conditions. Under favorable environmental conditions, kites have the ability to achieve high reproductive rates (Beissinger 1986) and, similarly, juvenile survival rates appear to be higher under more favorable conditions. Barring extreme climatological fluctuations in the coming years, we do not expect a significant change in the status of the population during the duration of this project.

Threats to the Species

There are a variety of threats that have been identified which affect kite nesting, foraging, and survival. These threats include loss of wetland habitats, degradation of wetland habitat, changes in hydrologic conditions, and impacts to prey base.

Collapse of nests constructed in herbaceous vegetation is cited as a cause of increased nest failure during low-water years. This is because the water table is usually below the ground surface at willow heads and other stands of woody vegetation during drought, causing snail kites to nest in herbaceous vegetation, where the nests are more vulnerable to collapse. This effect is more prevalent in lake environments than in the Everglades. Weather also can result in the variability of nesting success. Wind storms can cause toppling of nests, particularly on Lake Okeechobee and Lake Kissimmee due to the long wind fetch across these large lakes. Cold weather can also produce nest failure, either through decreased availability of apple snails or mortality of young due to exposure. Abandonment of nests before egg-laying is common, particularly during drought or following passage of a cold front.

The snail kite has apparently experienced population fluctuations associated with hydrologic influences, both human-induced and natural (Sykes 1983a; Beissinger and Takekawa 1983; Beissinger 1986), but the amount of fluctuation is debated. However, the abundance of its prey, apple snails, has been definitively linked to water regime (Kushlan 1975; Sykes 1979, 1983a). Drainage of Florida's interior wetlands has reduced the extent and quality of habitat for both the snail and the kite (Sykes 1983b). The snail kite nests over water and nests become accessible to predators in the event of unseasonable drying (Beissinger 1986; Sykes 1987b). In dry years, snail kites depend on water bodies that normally are suboptimal for feeding, such as canals, impoundments, or small marsh areas, remote from regularly used sites (Beissinger and Takekawa 1983; Bennetts et al. 1988; Takekawa and Beissinger 1989). These secondary or refuge habitats could play an important role in the future.

The principal threat to the snail kite is the loss or degradation of wetlands in central and southern Florida. Nearly half of the Everglades has been drained for agriculture and urban development (Davis and Ogden 1994). The Everglades Agricultural Area alone eliminated 3,100 square-miles of the original Everglades and the urban areas in Miami-Dade, Broward, and Palm Beach Counties have contributed to the reduction of habitat. North of Everglades National Park, which contains only about one-fifth of the original extent of the Everglades, the remaining marsh has been fragmented into shallow impoundments. The Corps' C&SF Project encompasses 18,000 square-miles from Orlando to Florida Bay and includes about 994 miles each of canals and levees, 150 water control structures, and 16 major pump stations. This system has disrupted the volume, timing, direction, and velocity of freshwater flow.

Degradation of water quality, particularly runoff of phosphorus from agricultural and urban sources, is another concern for the snail kite. The Everglades was historically an oligotrophic system, but major portions have become eutrophic, primarily due to anthropogenic sources of phosphorus and nitrogen (cultural eutrophication). Most of this increase has been attributed to

non-point source runoff from agricultural lands north of Lake Okeechobee, in the Kissimmee River, Taylor Slough, and Nubbin Slough drainages (Federico et al. 1981). Cultural eutrophication also is a concern in the Kissimmee Chain of Lakes. Nutrient enrichment leads to growth of dense stands of herbaceous emergent vegetation, floating vegetation (primarily water hyacinth [*Eichhornia crassipes*] and water lettuce [*Pistia stratiotes*]) and woody vegetation, which inhibits the ability of snail kites to forage along the shorelines of lake areas. Regulation of water stages in lakes and the WCAs is particularly important to maintain the balance of vegetative communities required to sustain snail kites.

Habitat loss to urban and agricultural development continues to occur, even within the current spatial extent of the habitat network. Habitat quality may be deteriorating as a result of increasing nutrients (Bennetts et al. 1994). Drying events also may be increasing above naturally occurring frequencies as a result of water management (Beissinger 1986).

Attempts to control, reduce and eliminate the spread of invasive and exotic species have also had negative effects on snail kites. Rodgers et al. (2001) describe a program to reduce impacts of aquatic plant management on snail kites. They found that the actions of several agencies in controlling aquatic plants have caused nest collapse, particularly in herbaceous vegetation such as cattail and bulrush. They state that these impacts in Lake Okeechobee and the Kissimmee Chain of Lakes were reduced through cooperation and improved communication between agencies. In addition to the potential collapse of nests, the Service is concerned about any excessive application of herbicides because this would reduce available habitat for apple snails. The Service has expanded on these coordination efforts to notify aquatic plant management groups during the kite nesting season on the location of active snail kite nests (Service 2006) to assist them in avoiding or minimizing effects.

ENVIRONMENTAL BASELINE

The environmental baseline includes the effects of past and present impacts of all Federal, State, or private actions and other human activities in the action area; the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation; and the impact of State or private actions, which are contemporaneous with the consultation in progress.

Before 1962, artificial regulation of the water levels in Lake Istokpoga was minimal and lake levels would fluctuate approximately 3 to 6 feet every year. High water levels above 40 ft (with a maximum of 42.9 ft) occurred 14 times in 26 years (1936 to 1962). Lake levels dropped below 36.5 ft 7 times over that same time frame (minimum level was 35.4 ft).

After 1962 and the construction of the S-68 outlet structure, the lake was not allowed to fluctuate as much. A maximum level of 40.0 ft was set and the lake has only exceeded that level once since then. The primary reason for the constriction of lake levels at 40.0 ft is flood protection for residences that have been built near the lake even though there are previously connected cypress wetlands that exist above that elevation. These cypress wetlands are now hydrologically isolated from the lake and as a result regeneration of cypress trees is minimal. Low water events are also

more restricted now. From 1962 to 1988, the lake dropped below 36.5 ft only once. After the new regulation went into place (in 1988), the lake again dropped below 36.5 ft once, but that was for the 2001 controlled vegetation enhancement project. The primary reason for the constriction of low lake levels is to ensure adequate water supply during the dry season. We believe that adverse changes in hydrologic and vegetative patterns have occurred due to management actions in Lake Istokpoga and the broader ecosystem. We also believe that there is a potential for reduction in apple snails since they are generally intolerant of frequent and long-lasting desiccation.

Additional actions by the State that are appropriate to include in the environmental baseline are the attempts to control aquatic nuisance and exotic plants in the lake. The Florida Department of Environmental Protection has periodically treated the lake with fluridone to control hydrilla (*Hydrilla verticillata*), which became problematic in the late 1980s. The extent of hydrilla in the lake has ranged between 2,000 and 26,000 acres. The Florida Fish and Wildlife Conservation Commission (FWC) has been spraying pickerelweed (*Pontederia cordata*) along the western shoreline with herbicides since October 2001. The purpose of this is to reduce the amount of dense vegetation so as to improve fish habitat.

The Service has consulted on three previous Lake Istokpoga deviation requests. The 2001 informal request was for a temporary lowering to an elevation of 36.5 ft for 90 days extending until July 1, 2001. The drawdown was requested by the FWC and District to complement their vegetation enhancement project. This was an attempt to improve the littoral habitat by mechanically scraping 21 miles of shoreline and removing 1,308 acres (2,370,320 cubic yards) of floating plant tussocks (FDEP 2003). The spoil was used to create in-lake islands in the littoral zone. We evaluated the Corps determination and concurred that the action was not likely to adversely affect the Everglade snail kite, wood stork, bald eagle, or Audubon's crested caracara. Nor would the action adversely affect snail kite critical habitat.

The informal request for the 2004 deviation was to delay the drop in lake stage from March 1 to May 15, 2004. The request change held lake levels more static, above the target line in the schedule, to allow more effective treatment of hydrilla by the FDEP. We agreed with the Corps' determination of no effect on Everglade snail kite, wood stork, Audubon's crested caracara, and bald eagle.

In May of 2007, the Service issued a Biological Opinion to the Corps on their formal consultation request for a temporary deviation to the Lake Istokpoga regulation schedule. The deviation would have allowed water withdrawals for agricultural water supply to continue at lower lake stages than under the approved regulation schedule. The Service concurred with the Corps' determination that the proposed project "may affect and is likely to adversely affect" the Everglade snail kite, and authorized the incidental take of up to13 adult kites in the form of harm or harassment as it related to a reduction in foraging opportunities in Lake Istokpoga for 2007. In actuality, the deviation was never implemented, because 2007 summer rainfall, although not abundant, was adequate to meet water supply needs without altering the lake's regulation schedule.

Previous formal consultations on the Everglade snail kite

In addition to the consultations on actions affecting the snail kite in Lake Istokpoga, the Service has evaluated impacts of past Federal actions in accordance with the Act throughout the species' range, including Everglades National Park, Water Conservation Areas, Lake Okeechobee, St. Johns Marsh, Kissimmee River, and Kissimmee Chain of Lakes. For the Kissimmee River Restoration project, we concluded that it would not be likely to adversely affect the snail kite, and therefore did not issue a Biological Opinion. The following paragraphs list some of the more significant formal consultations, but are not intended to be a comprehensive list of all formal consultations on the snail kite.

Only two Biological Opinions in our records reached a conclusion that a proposed action was likely to jeopardize the continued existence of the snail kite. The first was in response to the Corps' Regulatory Program regarding a wetland fill permit for a private housing development, Ibis Landing, in Palm Beach County. Our October 22, 1986, Biological Opinion proposed a Reasonable and Prudent Alternative to redesign the proposed project to avoid impacts on wetlands known to be of great importance as habitat for the snail kite. The Corps' permit was issued with a modified design protecting the most important snail kite habitat on the property.

The second jeopardy Biological Opinion was a February 13, 1990, Biological Opinion on the Basic Raindriven Plan for the Modified Water Deliveries to Everglades National Park Project. This Biological Opinion led to more intensive and extensive studies on the ecology of the snail kite in Florida, and the resulting scientific findings have significantly altered the assumptions of the 1990 Biological Opinion, which represented the best available science at that time. Another Biological Opinion, also focused on hydrology in the southern portion of the snail kite's range, dealt with Test Iteration 7 of the Experimental Program of Water Deliveries to Everglades National Park. Although that October 27, 1995, Biological Opinion found that the proposed action was likely to jeopardize the continued existence of the endangered Cape Sable seaside sparrow, it concurred with the Corps' determination of "not likely to adversely affect" the snail kite. Our February 19, 1999, Biological Opinion on the Water Deliveries to Everglades National Park project, Experimental Water Deliveries Program, and the C-111 Project concluded that the proposed action would jeopardize the continued existence of the Cape Sable seaside sparrow. However, it also concluded that the action would adversely affect, but would not jeopardize the continued existence of the endangered wood stork and snail kite, and would not destroy or adversely modify the snail kite's critical habitat.

On March 28, 2002, the Service issued a Biological Opinion on the Interim Operating Plan for Protection of the Cape Sable seaside sparrow (IOP). This Biological Opinion found that the proposed action would not jeopardize the continued existence of the sparrow or snail kite. The most recent (November 17, 2006) Biological Opinion issued by the Service addressing water management in the southern Everglades also addressed the IOP. Similar to the actions considered in the above referenced 2002 Biological Opinion, the emphasis of the Corps' planning was to ensure survival of the sparrow, but we also needed to address effects on other listed species, including the snail kite. The 2006 Biological Opinion continued to identify that water management practices to protect the sparrow were not favorable to habitat conditions for

the snail kite, particularly with respect to deeper water in WCA 3A. However, the Biological Opinion concluded that such conditions would not jeopardize the continued existence of the kite, and that these conditions were expected to be remedied with future improvements to the water control infrastructure, and that we did not anticipate any permanent loss of designated critical habitat for the snail kite. For more details regarding the history of Service' endangered species consultation process in the southern Everglades, please refer to the Consultation History section of the 2006 IOP Biological Opinion.

We formally consulted on another action in the southern portion of the snail kite's range in ENP, but it differed from the above consultations in that it involved the Everglades National Park 2003-2005 Prescribed Burn Plan, rather than water management actions. The Service recognized that periodic fire was necessary to sustain habitat conditions for a variety of wildlife (long-term effects), including the snail kite, but needed to estimate short-term effects for the snail kite. We concluded in our April 1, 2003 Biological Opinion that adult snail kites were not likely to be injured or killed because of the actions, but prescribed fire may result in direct impacts to kite foraging and nesting habitat, and kite nests. In addition, up to 40 individual kites could be harassed. In a similar analysis of the 2003-2004 Burn Plans on the Loxahatchee National Wildlife Refuge (June 10, 2003), we estimated that two birds per year would likely be harassed in that habitat.

On September 19, 1996, we issued a Biological Opinion in response to a Corps permit application by the Florida Department of Transportation to construct three recreational access points along Interstate 75 in Broward County. Interstate 75 runs through WCA-3, and our Biological Opinion addressed effects on the snail kite, wood stork, and the Florida panther (*Felis concolor coryi*). For the snail kite, we did not anticipate mortality of adult birds, but we anticipated potential disturbance of nests, with some loss of eggs or nestlings, primarily due to increased airboat traffic. To reduce the incidental take of all three listed species, we provided terms and conditions, which included improved signage and educational materials for potential airboat users about the presence and sensitivity of these species, and improved mapping of established trails.

We formally consulted with the Corps regarding the Water Management Plan for the Blue Cypress Water Management Area, Upper St. Johns River Basin Project. A portion of that Water Management Area is designated as critical habitat for the snail kite. The local sponsor for this project is the St. Johns River Water Management District. Our Biological Opinion, dated November 14, 1996, provided a number of terms and conditions to reduce incidental take, including monitoring of snail kite activity and habitat usage, vegetation changes, water levels, and water quality.

The Service issued a Biological Opinion, dated July 3, 2002, which addressed the Corps' issuance of a permit to the Florida Fish and Wildlife Conservation Commission to draw down water levels and scrape accumulated organic sediments in Lakes Tohopekaliga, Kissimmee, Cypress, Hatchineha, and Tiger in the Kissimmee Chain of Lakes. This Biological Opinion analyzed impacts on the snail kite for a habitat management action that in the longer term has proven to be beneficial to the snail kite, but required granting incidental take for short-term

adverse effects. This Biological Opinion referred back to previous projects of a similar nature that the Service had reviewed, including lake habitat enhancement projects in Lake Tohopekaliga (1971, 1979, and 1987), Lake Kissimmee (1977 and 1996), and East Lake Tohopekaliga (1990). Again, we provided terms and conditions to reduce incidental take, and the FWC funded a number of studies to test the effects of the management actions (drawdown alone and drawdown with muck removal) on snail kites, apple snails, and vegetation. Through these studies and subsequent observations, we are confident that such projects can have long-term beneficial effects on snail kite habitat, if they are not conducted too frequently.

On October 23, 2003, we provided an intra-Service consultation on the effect of issuance of a recovery permit to Dr. Wiley Kitchens of the University of Florida, and students working under him, to continue research on the species. During the course of their research, they handle many nestling snail kites to band them. We estimated that capture, handling, and banding might result in the accidental injury or death of 1 percent of the snail kites captured. Based on the expectation that up to 300 chicks may be captured per year, up to 3 individual chicks may be injured or killed per year.

We have recently (May 18, 2007) formally consulted on a deviation to the normal regulation schedule for Lake Istokpoga that was requested by the District in response to severe drought. At the time of the consultation, three snail kite nests were active on the lake, for which we had to grant incidental take. Of the three nests, one failed for unknown reasons, and the other two successfully fledged. In actuality, the lake stage did not reach the low levels requiring implementation of the requested deviation.

The most recent Biological Opinion issued for a project affecting the snail kite was in October 2007, and was in response to the proposed revision of Lake Okeechobee's regulation schedule. The Corps proposed an interim change to the lake's regulation schedule to meet multiple project purposes such as flood control, water supply and environmental protection. The Opinion analyzed the effects on the snail kite of lowering the annual average lake stage within Lake Okeechobee by an average of 1.5 ft. The breeding population of snail kites on the lake has been in decline for many years due to inappropriate water levels, and the Service believed that the proposed change in regulation schedule would produce a net benefit to the species by improving the foraging habitat within Lake Okeechobee's littoral marshes. No incidental take was authorized for the project, and Terms and Conditions were provided that required annual monitoring of apple snails and regular mapping of the lake's littoral vegetation in order to track and quantify possible future take of the snail kite.

To date, the Service has not entered into formal consultation on the snail kite for any of the projects identified as part of the District's Acceler8 program. We have formally consulted regarding effects of Acceler8 projects on other species, particularly the threatened eastern indigo snake and Audubon's crested caracara (*Polyborus plancus audubonii*). The C-44 and C-43 projects will be located on former citrus groves, which are generally of low or negligible value as habitat for the snail kite. Likewise, the site of the EAA Reservoir project had been sugarcane fields and some sod farms, neither of which are considered particularly valuable as snail kite habitat. Based on a review of prior habitat conditions, the Picayune Strand Restoration project

and the other Acceler8 projects were likewise found not to affect the snail kite. We have recently re-initiated informal consultation with the District on the C-44 project to ensure that copper contamination will not adversely affect snail kites through the food chain. We are working with the District to ensure that they include monitoring of copper concentrations in apple snails to verify that potential foraging by snail kites in the stormwater treatment area of the C-44 project will not pose a risk to the snail kite.

Status of the Species Within the Action Area

Because we have defined the action area for this deviation request to encompass the state-wide range of the Everglade snail kite, we have essentially described the status of the species within the action area in the previous section of this report. In this section we will discuss the snail kite usage of Lake Istokpoga.

We have less information about snail kite usage in Lake Istokpoga than in other more traditionally used water bodies in Florida (*e.g.*, Lake Okeechobee and the WCAs). We have frequent, systematic snail kite survey data for Lake Istokpoga from 2005 through 2007. Prior to that, there were no consistent surveys. We have evidence that snail kites historically used Lake Istokpoga (Sykes 1979). In 2005, there were four nests in Lake Istokpoga and all were successful resulting in nine fledglings (Figure 5). Only one kite nest was reported on Lake Istokpoga in 2006 and it was not successful. The reason for nest failure is not known. We also do not know why only one kite nesting attempt was made. It may have been due to the constant, high lake levels from January to March 2006 and then a rapid 2-foot recession over the next three months. It is also possible that habitat was better elsewhere in the system, or that nests were missed by the survey crew, or that this is within the natural variation in nesting for kites in Lake Istokpoga. The survey data for 2007 have not been completely evaluated; however, as of this writing in November 2007, the nesting season is complete, and three kite nests were recorded during the season, two of which successfully fledged young.

We presume the high success rate seen in 2005 and 2007 was due to high quality kite foraging habitat (both habitat structure and snail abundance) along the western shore of the lake. The 2006 nest failed for unknown reasons, but we can conclude that snail conditions on the lake were at least adequate for successful nesting. However, snail density estimates for the western shore of Lake Istokpoga (near the areas used by kites for nesting the past three years) range from 0.10 to 0.16 snails/m^2 (Darby 2007), which is close to what is considered the minimum snail density necessary to support snail kite nesting (Darby et al 2006). There are some portions of the western and northern shores of the lake that have up to 0.66 snails/m^2 (Darby 2007), so perhaps the snail distribution in Lake Istokpoga is patchy. Since the snails are believed to be still recovering from the 2001 drought/drawdown (Darby 2007), and current vegetation conditions in the lake's littoral zone are generally good, the snail population in early 2008 will likely be as healthy, or healthier, than in 2007. There is no existing monitoring program in place to assess apple snail response to the drought and the deviation, if it occurs. We do know that snails cannot tolerate extended periods (on the order of months) of desiccation. Therefore, it would be prudent to assess the effects of this drought on apple snail survivability and subsequent apple snail and snail kite reproduction.

Factors Affecting Species Environment Within the Action Area

Generally, operation of the C&SF Project and other hydrologic management has a significant effect on hydrologic conditions within most of the areas occupied by snail kites. The Corps, District, and St. John's River Water Management District manage water levels in snail kite habitat in accordance with many different local and regional water management plans and schedules. Water management plans affect water levels in marshes and lakes upon which snail kites rely, the rates of water level recessions in lakes and marshes, and the timing of high and low water events. These factors directly affect snail kite habitat suitability. Today, the fluctuations in water stage in Lake Istokpoga are, more or less, within the control of human management (within 0.25 foot). This is because of the capacity of the two outlet structures (S-68 and the G-85 on the Istokpoga Canal) and today's weather forecasting capabilities that allow District managers to prepare for high-water events. As a result, the District can meet the current regulation schedule most of the time. The current drought, which is covering the entire range of the snail kite, represents one of those times when water managers may be limited in their ability to meet the regulation schedule. In the event that kite habitat is impacted by water management in any given year, these changes may be reversible by restoring favorable hydrological conditions to the lake in subsequent years.

Low Lake Stages

Drydowns result from hydrologic management, including both intentional drawdowns to aid in habitat restoration, and drydowns that result from a combination of water management activities and unexpected environmental conditions, such as the 2000-2001 drawdown and drought. Extremely low lake levels expose the littoral zone to desiccation, thereby reducing snail abundance, and limiting the kite's ability to see and forage on snails. This may also reduce the amount of suitable herbaceous nesting substrate. All these factors combine to render the area unavailable as habitat for nesting kites. Apple snail populations can also be reduced, sometimes requiring years to rebound. During the development of the Minimum Flow and Level for Lake Istokpoga the District noted that 36.5 ft is the level at which negative effects to the submerged aquatic vegetation beds begins (District 2005).

The apple snail is not a highly mobile creature. Unlike some other aquatic animal species, apple snails will not move extensively to follow the optimal water conditions that will vary with season and year (Darby et al. 2002). When a portion of the littoral zone inhabited by apple snails dries out because of lowering lake stage, the snails will aestivate in the detritus, and await the return of the water. After a period of time, the snails will die if the area remains dry. According to Darby (2006), adult apple snails show the following desiccation tolerances: a 3-month dry-out will kill 21 percent of the population; a 4-month dry-out will kill 50 percent of the population; and a 4.5-month dry-out will kill 63 percent of the population. Juvenile snails have even less tolerance to desiccation. For example, a 3-month dry-out will kill 40 percent a population of 6-week old apple snails (10-15 mm in size). Considering that apple snails only live for a year to 18 months, littoral zone dry out could adversely affect a lake's entire apple snail population, especially if it occurs during peak snail breeding season (April to June). Therefore, when discussing the drying

of the littoral zone, it is important to keep in mind not only how low the water gets, but even more importantly, for how long and at what time of the year.

Recessions
Snail kite nests are almost always built over water; therefore, a rapid recession of water level can cause snail kite nests in herbaceous vegetation to collapse due to the weight of the nest. Recessions that completely dry out the area around the nest have the added impact of increasing the potential for nest predation. Apple snail reproduction can also be negatively impacted by recession if the area dries shortly after snails lay eggs. Newly hatched young snails are not able to survive long periods with water levels below ground. Rapid recession in spring months may result in reduced snail recruitment, and more stranded adult snails that will be unavailable to kites, consequently reducing snail kite foraging suitability.

Water Quality
Degradation of water quality, particularly runoff of phosphorus from agricultural and urban sources, is another factor potentially affecting snail kite habitats. As phosphorus concentrations increase, vegetation changes can occur in the littoral and nearshore zones. Increases in the spatial extent of nuisance algae or exotic plants can reduce kite foraging habitat.

Exotic and Invasive Vegetation
Exotic and invasive aquatic plants have had an impact on snail kite habitat within the lake systems and other areas. Species such as water hyacinth and water lettuce can grow rapidly within lake littoral zones, completely obscuring areas where kites forage, and can even affect littoral zone vegetation composition and cover by shading other species, changing the water temperature, and competing for space. Dense mats of these species make an area unsuitable for kite foraging. Hydrilla, for example, is an aquatic invasive plant that has become the dominant submerged species in Lake Istokpoga. Hydrilla infestations may cause changes in submerged plant species that will affect the abundance, sustainability, and availability of apple snails.

Efforts to control these invasive exotic plants have also affected snail kite habitat. The FWC has been selectively spraying pickerelweed and other tussock-forming plants with herbicides (both aerially and from an airboat) since October 2001 in an attempt to improve fish habitat. "Sparsely" vegetated areas of pickerelweed are maintained as such, while “densely” vegetated areas along the shoreline littoral zone are either broken up in smaller areas or thinned out to become sparsely vegetated areas. Pickerelweed around Big Island and Bumblebee Island marshes are not treated. It is unclear at this time whether or not herbicide usage in the lake is affecting snail kites. Certainly, if herbaceous vegetation that would otherwise be used for kite nesting is killed, then that could affect the kite population for that year. Additionally, herbicides often cause detrimental impacts to non-target species such as submerged aquatic plants, resulting in reduced habitat suitability for apple snails.

Recreation
Recreational activities directly affect the suitability of kite habitat. Boat and airboat traffic throughout snail kite habitat can cause some local vegetation changes, and can temporarily affect

the suitability of kite foraging habitat. In addition, these activities may result in disturbance to kites; boat wakes can also cause nests in herbaceous vegetation to collapse.

EFFECTS OF THE ACTION

Long-term effects on habitat suitability for snail kites in Lake Istokpoga (either beneficial or adverse) are difficult to accurately predict. The Service agrees that periodically drying the littoral zone of Lake Istokpoga is likely to be ecologically beneficial. However, the rate of lake level drop and the duration that the lake remains at any specific elevation needs to be tied to a specific ecological goal, rather than a water supply goal. It is unclear at this time to what degree and frequency drawdowns should occur for the conservation of snail kites. The Lake Okeechobee Watershed Project (LOWP) study team, in their development of a future Lake Istokpoga regulation schedule, predicted that a drawdown with a return frequency of twice in 9 years for 6 weeks at about 36.0 ft would allow for beneficial oxidation of organic matter in the littoral zone to maintain a sandy substrate. They predicted that the oxidation of floating plant "tussocks" would lead to overall better lake habitat for fish and water birds. However, the team noted that adaptive management would be an important facet of that schedule's implementation because many of the effects are unknown and would need to be monitored and evaluated.

The proposed action (Alt-2) would allow water managers to drop lake levels to 36.0 ft thereby drying most of the 6,000-acre littoral zone and a portion of the nearshore zone unless substantial precipitation occurs. Lower than normal lake levels can adversely affect both apple snails and snail kites and their habitats. Kite nests may be more likely to collapse, resulting in death of eggs or nestlings, because the proposed action may accelerate the rate of falling lake stages. Desiccation of the littoral zone can decrease the visibility of snails to foraging kites and kill apple snails. If drying of snail habitat occurs during the apple snail's peak breeding season (April to June), then recruitment into the following years' snail population would be severely reduced. Our current understanding is that complete drying of the littoral zone for a period of 3 to 4 months would nearly eliminate apple snails from the lake, and it could take several years for the apple snail population to reach a density that would support snail kite nesting. Vegetation shifts in the littoral zone may improve or negatively impact nesting substrate for kites. Improvements may come from regeneration of woody species (willows and cypress) which generally are less likely to collapse than cattails and rushes.

Low water levels would require kites to nest in herbaceous vegetation such as cattails or bulrush, increasing the risk of nest failure due to collapse or loss by increased access to nests by terrestrial predators. Because the drawdown would occur in late spring, conditions for nesting may be adequate early in the year, which may result in kites initiating nesting, and perhaps laying eggs, only to have the nests fail later in the spring. It would likely be better for the species if the lake was unappealing as a nesting site from the beginning of the nesting season in the late winter, so that they would be encouraged to not attempt to nest at Lake Istokpoga and instead seek better nesting habitat elsewhere in their range. However, other than drastically lowering the lake early in the dry season (which would likely be unacceptable from a water supply standpoint), the Service cannot recommend a way to reduce the initiation of nesting by snail kites early in their typical nesting season. The predicted recession rate, while steeper than ideal, is not so drastic as

to necessarily preclude some successful nesting in 2008. Although the simulations used in this analysis use the best available data, the Service will continue to monitor the status of snail kite nesting on the lake in conjunction with the observed rates of recession. Some successful nesting may occur, although this is somewhat less likely with the deviation than with the no-action scenario.

According to vegetation mapping of Lake Istokpoga conducted by the District over the winter of 2004-2005, there are approximately 2,730 acres of snail kite habitat within the lake's littoral zone. We have identified four broad cover types as snail kite habitat for this analysis: mixed wetland shrubs (for nesting); and freshwater marsh, wet prairie and emergent aquatics (as apple snail habitat for kite foraging). Model simulations show that without the proposed deviation, water elevations would drop to 36.5 ft for approximately one month during early summer 2008, at which point around 1,780 ac of the snail kite habitat (or approximately 65 percent of the total) would be dry (Figure 6). The originally proposed deviation would drop the lake stage another foot down to 35.5 ft, which would result in an additional 800 ac of snail kite habitat drying out (2,580 ac, or 95 percent of the total) (Figure 6). Due to the nature of the bathymetry data used for this analysis, we are not confident in interpolating the amount of kite habitat that would now remain inundated at 36.0 ft. However we are confident that additional habitat would be available for apple snail breeding and survival until the 2009 breeding season.

Survival of apple snails under the conditions of the proposed deviation will depend upon the severity and duration of the dry-down. If the lake stage does not fall below 36.0, and stays below 36.2 ft (the stage at which snails likely cease movement) for no longer than 12 weeks, then snail mortality will be minimized, with approximately 75 percent of the near-adult size snails surviving to breed in 2009 (Darby 2007). If the lake stage falls below 36.0 ft for the same period of time, this would likely result in approximately 50 percent mortality of large apple snails (those hatched early in the snail breeding season), and almost complete mortality of smaller snails (those hatched after May). Such an impact to the apple snail population would put a severe strain on the nesting efforts of any snail kites that may attempt to nest on the lake in subsequent years. Discussions of this impact in teleconferences and emails influenced the Corps' decision to approve the deviation only down to 36.0 ft.

Although the Service has supported control of invasive species and reduction of accumulated lake sediments in central and south Florida, our evaluations of such actions are formed on a case-by-case basis. In the case of Lake Istokpoga in 2007, apple snails are expected to be present in lake sediments following the expected drought. We are concerned about the potential loss of aestivating snails, with the effects of drying of the littoral zone, combined with other management actions (application of herbicides, muck removal and burning).

Due to the relative lack of information for Lake Istokpoga, we await data on how severe the impact of the 2007 drought will be in terms of total kite population estimates, apple snail densities, and the return of successful kite nesting to Lake Istokpoga in subsequent years. These data will allow the agencies to make better decisions about the effects of lake levels on snails and kites and assist in the implementation of future revisions to the Lake Istokpoga water regulation schedule.

If the 2008 wet season begins in a typical fashion (late May or June), we do not anticipate that major vegetation changes in the littoral or nearshore zones following refilling of the lake will occur and cause an adverse effect on snail kites. If the drought continues such that water levels in Lake Istokpoga do not return to normal by October 2008, we may need to reevaluate the effects on vegetation patterns in the littoral and nearshore zones.

CUMULATIVE EFFECTS

Cumulative Effects on the Species

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this Biological Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require a separate consultation pursuant to section 7 of the Act.

A variety of State and local government actions can directly or indirectly affect water volumes and water quality that could, in turn affect the quantity and quality of habitat for the Everglade snail kite. Municipal and county governments in Florida are required to use a “Comprehensive Plan" or "Growth Management Plan" to guide land use changes under rules promulgated by the Florida Department of Community Affairs (Chapter 163.3164, Florida Statutes). The Florida Department of Community Affairs also requires an Application for Development Approval for larger scale development projects deemed to have a regional impact (Developments of Regional Impact). The Application for Development Approval is not intended to supplant local, state, or Federal permitting procedures, but it provides a comprehensive look at a proposed development. It also serves as the basic data source for the preparation of the regional planning council’s report and recommendations to the local government on the regional impact of the proposed development. Florida’s Water Management Districts also govern the permitting of water use for individual development projects, conduct regional water supply studies, and regulate surface water management under their Environmental Resource Permits. To the extent practicable, the Service attempts to track such State and local actions that may affect snail kites or their habitat and provide technical assistance, as appropriate.

While the above actions are not necessarily subject to the consultation requirements of the Act, the Service often becomes aware of such proposals through a variety of public forums, news reports, or through early inquiries by environmental consultants who request a list of threatened or endangered species that may be present in the project area. In the case of a wetland-dependent species such as the snail kite, any early comments by the Service will normally lead to the opportunity for consultations under the Act through the Corps’ Section 404 permit process.

Actions that are reasonably certain to occur at this time include several Developments of Regional Impact currently under review by the State, particularly in the area surrounding the cities of Kissimmee and St. Cloud. These developments are located around or adjacent to the Kissimmee Chain of Lakes, an important habitat region in the northern portion of the snail kite’s range. In addition to more local impacts on the quantity, quality, timing, and distribution of

water in the Kissimmee Chain of Lakes, project designs are expected to address the potential impact of such developments on downstream habitat for the snail kite, including the Kissimmee River, Lake Okeechobee and the Everglades. Another area of reasonably certain development that is adjacent to important snail kite habitat is in Palm Beach County, around Grassy Waters Preserve. Grassy Waters Preserve is managed by the City of West Palm Beach as part of its water supply. Although water management decisions by the city are not directly subject to Federal oversight under the Act, the Service is an active planning partner in the North Palm Beach County Project (a component of the CERP), and this project is addressing future water management in this area, subject to consultation with the Corps' Planning Division. We are confident that any additional development proposals surrounding Grassy Waters Preserve will be addressed by the Service through consultation with the Corps' regulatory program.

In summary, although cumulative effects on snail kites would likely be limited in scope because large developments are anticipated to require a Corps permit (and consequently subject to section 7 consultation under the Act), the impacts would be of greater concern this year if coupled with a deviation from Lake Istokpoga's regulation schedule.

CONCLUSION

Because of the timing and duration of the proposed drawdown, the deviation to the regulation schedule will likely cause injury or mortality to snail kite nestlings and/or eggs. The deviation may also reduce the existing apple snail population for this year. Effects of the deviation are expected to be temporary and last no more than one year. Kites are expected to return to Lake Istokpoga in 2009 if the drought ends with next year's wet season, and the terms of this deviation are followed, thereby not impacting the apple snail population beyond what was described in this analysis. No adult kite mortality is anticipated due to this deviation. Adults are long-lived and known to be able to move to other locations if conditions are severe enough. One year of reproduction (up to four nests, the maximum detected at Lake Istokpoga) may be lost due to the deviation. Given drought conditions throughout the range of the species, juvenile survival will likely be low with or without the deviation, but juvenile survival is expected to improve at Lake Istokpoga and elsewhere as conditions improve, as is illustrated by this species' response to previous droughts.

After reviewing the status of the Everglade snail kite, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that this temporary deviation to the Lake Istokpoga regulation schedule, as proposed, is not likely to jeopardize the continued existence of the Everglade snail kite.

INCIDENTAL TAKE STATEMENT

Sections 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly

impairing essential behavioral patterns such as breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns, which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The Service will not refer the incidental take of any migratory bird for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C §§ 703-712), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

The measures described below are nondiscretionary, and must be undertaken by the Corps so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in action 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the Corps must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement.

AMOUNT OR EXTENT OF TAKE

The Service anticipates that incidental take of Everglade snail kites as a result of this action may be difficult to detect for the following reasons: the snail kite is relatively secretive and occupies expansive areas of marshes where it is unlikely that injury or mortality of individuals will be detected and where it is unlikely that all snail kites will be detected by monitoring crews. In cases where known kite nests fail, it may be difficult to determine that the deviation to the schedule was the cause. However, take of this species, in the form of harm or death of snail kite eggs and nestlings is anticipated during the 2008 nesting year.

Direct impacts on nests and nestlings are expected to occur in 2008. More rapid recession of lake stage during the kite nesting season may lead to nest failure from increased predation and potential nest collapse, particularly those that have been built in herbaceous vegetation. Additionally, recessions that occur during the peak of the kite breeding season may also reduce the abundance and availability of apple snails thereby leading to the potential starvation of nestlings. Based on the information known about the past three years of kite nesting on Lake Istokpoga, we authorize incidental take in the form of injury or mortality of the eggs or chicks in up to four nests during the 2008 breeding season. We also authorize incidental take for all breeding and non-breeding adults on Lake Istokpoga in the form of degraded foraging conditions as a result of the deviation; however, we do not anticipate any mortality of adult kites. During the peak of the 2007 nesting year, there were 13 adult kites on Lake Istokpoga (Martin 2007); therefore, we authorize take of up to 13 adult kites in the form of reduced foraging success in

Lake Istokpoga (harm) and movement to other locations to access prey (harassment). No adult snail kites may be killed as a result of this action. We anticipate this action and its effects to be temporary in nature; therefore it is not expected that this species will be permanently extirpated from Lake Istokpoga. If, however, the lake stage drops below 36.0 ft during the course of the deviation, the authorized level of incidental take will be exceeded.

EFFECT OF THE TAKE

In the accompanying Biological Opinion, the Service determined that this level of anticipated incidental take is not likely to jeopardize the continued existence of the species.

REASONABLE AND PRUDENT MEASURES

Because the scope of the action was limited to water management decisions in response to the 2007 - 2008 drought, we have limited our Reasonable and Prudent Measures to those that will assist in reducing the incidental take associated with the water management deviation, and those that will be useful in better assessing the impacts of similar actions in future droughts. The Service believes the following Reasonable and Prudent Measures are necessary and appropriate to minimize the incidental take of Everglade snail kites.

1. *Artificial Nest Support.* Nest collapse, while an occasional natural part of the snail kite's life history, may be exacerbated by this action. It is possible, if correctly done, to artificially support the nest prior to it collapsing. This is a last resort that should only be attempted if the nests are expected to collapse.

2. *Minimum Lake Stage*. The District controls the lake stage to a certain degree through management of water supply releases, which are in turn governed by the release zones delineated in the regulation schedule (and this deviation), and by implementing water supply cutbacks of varying severity, based upon supply, demand and other concerns. This proposed deviation sets a new lower boundary for Zone B of the regulation schedule, but does not specify water supply cutbacks, as these will be adaptively managed throughout the period of the deviation. Similar to the 2006 - 2007 drought, the Corps and the Service to participate in regularly scheduled teleconferences during the drought (known as principals' meetings). These can serve as a forum to discuss the adaptive management of water supply cutbacks through the drought.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Corps must comply with the following Terms and Conditions, which implement the Reasonable and Prudent Measures, described above and outline required reporting/monitoring requirements. In the event that the deviation is not granted, these Terms and Conditions will not apply; otherwise, these Terms and Conditions are nondiscretionary.

1. *Artificial Nest Support*. Any active kite nests in herbaceous vegetation that are determined to be at risk of collapse will be artificially supported using three PVC posts (or similarly suitable material). This should be done by the University of Florida researchers who are currently monitoring the status of snail kite nesting in Lake Istokpoga, under a contract partially funded by the Corps. The Service should be notified when such an action is considered or implemented.

2. *Minimum Lake Stage*. Because of the sensitivity of apple snail populations to fluctuations in lake stage, all efforts should be made to prevent the water elevation within Lake Istokpoga from dropping below 36.0 ft during the course of this deviation. Aside from factors outside of the District's control (particularly climate), the District can influence to a certain degree the rate of drop in lake stage through establishment of water supply cutbacks. The involved parties will use the principals' meetings to assess the need for additional cutbacks (and any other available means) to prevent the situation from occurring where lake stage would drop below 36.0 ft. If the lake stage drops below this level, then incidental take will be exceeded, and the Corps should immediately reinitiate consultation.

Upon locating a dead, injured, or sick specimen of any threatened or endangered species, initial notification must be made to the nearest Service Law Enforcement Office (Fish and Wildlife Service; 9549 Koger Boulevard, Suite 111; St. Petersburg, Florida 33702; 727-570-5398). Secondary notification should be made to the Florida Fish and Wildlife Conservation Commission; South Region (3900 Drane Field Road, Lakeland, Florida, 33811-1299; 800-282-8002). Care should be taken in handling sick or injured specimens to ensure effective treatment and care or in the handling of dead specimens to preserve biological material in the best possible state for later analysis as to the cause of death. In conjunction with the care of sick or injured specimens or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

The Service believes that no more than four nests containing up to eight eggs or chicks will be incidentally taken as a result of this action. We also believe that the adult kites present on the lake may experience disturbance in the form of reduced forage (apple snails) during the 2008 breeding season. The Reasonable and Prudent Measures, with their implementing Terms and Conditions, are designed to minimize incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the Reasonable and Prudent Measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the Reasonable and Prudent Measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to further minimize

or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. A crucial life history parameter that needs better direct and empirical correlation with snail kite foraging and nesting success in Lake Istokpoga is the distribution and density of apple snails in the lake. This is presented as an essential tool in determining incidental take of snail kites in the lake and evaluating the impact of management actions in reducing the level of incidental take across fluctuations in rainfall that occur on the scale of a decade or several decades. In addition to better establishing this relationship, we must know more definitively about the time required for apple snails to become re-established at peak densities in the littoral zone after disturbances, particularly droughts severe enough to dry the entire littoral zone. Additionally, information on apple snail density should provide empirical evidence on what degree of impacts on the snail kite may be expected in less severe or less prolonged low water levels. This would give us a better sense of the balance of ecological benefits and risks in moderate drying of the littoral zone. The Corps should consider implementation or funding of apple snail monitoring within the littoral zone of Lake Istokpoga. Although apple snail researchers have recently sampled apple snail populations in Lake Istokpoga, there is no existing monitoring program in place to follow up in assessing apple snail response to the drought and the deviation.

2. Several management agencies are involved in programs to spray herbicides in Lake Istokpoga to control both invasive exotic plant species and some native species that are considered a nuisance. The largest of the efforts to control hydrilla are performed by the FDEP. The FWC has sprayed herbicides in the littoral zone for fish habitat management. During previous drawdowns, the FWC has also removed accumulated muck and vegetative tussocks from the lake's littoral zone in order to improve vegetative conditions for sport fish habitat. Multiple agencies have cooperated in minimizing direct disturbance of snail kite nests by following avoidance recommendations developed by the Service. We are confident that the established protocols will continue to protect active nests from various types of disturbance, including spraying of herbicides. However, we are also concerned about potential effects on apple snail populations (through changes in vegetative structure, not direct toxicity), particularly when coupled with the anticipated adverse effects of the low water levels under the proposed action. The Service recognizes that the above management practices may have long-term benefits to the ecology of the lake (including snail kite habitat suitability), but we recommend that these plans be reconsidered for the coming year in recognition of environmental conditions in the current drought. While we recognize that the application of herbicides by agencies other than the Corps is not under the Corps' control, we ask that you assist us in bringing our concerns to appropriate managers to reduce potential impacts on apple snails. Although future nesting patterns of snail kites cannot be accurately predicted, based on nesting patterns since 2005 (Figure 5), we ask that any lake management activities in the western littoral zone and the adjacent nearshore zone will be coordinated with the Service (Figure 7). Continued participation in principals' meetings throughout the drought can serve as an appropriate forum for the discussion of these concerns.

3. The District has initiated a pilot project for the captive breeding of apple snails for potential restocking. The Service is committed to cooperate with the District in determining the appropriate disposition of the snails. Details of where and when the snails presently in cultivation will be released into the wild have not yet been determined. Snail researchers are currently investigating genetic concerns associated with the translocation of apple snail stock from one part of their range to another. A pilot study should be conducted to assess the possible benefits of the release of snails in an attempt to accelerate the repopulation of snails in lakes and other wetlands following a drought.

REINITIATION NOTICE

This concludes formal consultation on the proposed action. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded, as defined by the action area measures provided in this project description; (2) new information reveals effects of the agency's action that may affect listed species or critical habitat in a manner or to an extent not considered in this Biological Opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Biological Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Thank you for your cooperation and effort in protecting fish and wildlife resources. If you have any questions regarding this project, please contact me, Bob Pace or Doug Chaltry at 722-562-3909.

Sincerely yours,

Paul Souza
Field Supervisor
South Florida Ecological Services Office

cc:
Corps, Planning Division, Jacksonville, Florida (Catherine Byrd, Barbara Cintron)
District, West Palm Beach, Florida (Kim O'Dell)
FWC, Tallahassee, Florida (Mary Ann Poole)
FWC, Vero Beach, Florida (Joseph Walsh)
FWC, Okeechobee, Florida (John Beacham Furse)
Service, Atlanta, Georgia (Noreen Walsh, Dave Horning) electronic copy only
Service, Jacksonville, Florida (Miles Meyer) electronic copy only
Service, Vero Beach, Florida (Cindy Schulz) electronic copy only

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Table 1. Acronyms and abbreviations used in this document.

Acronym/ Abbreviation	Definition
Act	Endangered Species Act of 1973, as amended (87 Stat. 884; 16 U.S.C. 1531 *et seq*.)
C&SF	Central and Southern Florida
CERP	Comprehensive Everglades Restoration Plan
cfs	cubic feet per second
Corps	U.S. Army Corps of Engineers
District	South Florida Water Management District
ENP	Everglades National Park
ft	feet
FDEP	Florida Department of Environmental Protection
FWC	Florida Fish and Wildlife Conservation Commission
LOWP	Lake Okeechobee Watershed Project
MSRP	South Florida Multi-Species Recovery Plan
NGVD	National Geodetic Vertical Datum
Service	U.S. Fish and Wildlife Service
WCA(s)	Water Conservation Area(s)

Table 2. Number of active snail kite nests by wetland, 1996 through 2007.

Regions	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
WCA 1	-	1	14	-	-	-	0	-	-	-	2	0
WCA 2A	0	0	0	0	0	0	0	0	0	0	0	0
WCA 2B	3	25	125	0	0	0	11	17	18	0	2	0
WCA 3A	80	247	221	70	112	0	60	82	48	12	58	2
WCA 3B	0	0	3	5	26	0	3	2	6	0	17	1
Tohopekaliga	23	38	2	3	7	15	22	17	0	47	28	81
E. Tohopekaliga	-	-	-	-	-	4	4	1	1	1	1	1
St. Johns Marsh	16	26	9	12	6	1	1	10	22	9	16	0
Kissimmee	0	6	5	39	3	29	4	12	8	9	1	7
Lk. Okeechobee	34	4	8	0	0	0	0	5	8	23	10	0
West Palm/ Grassy Waters	0	2	3	0	3	0	-	3	0	14	1	0
Everglades National Park	5	0	0	0	12	0	-	-	-	0	22	5
Lk. Istokpoga	-	-	-	-	-	-	-	-	-	4	0	3
Other	8	1	6	5	-	-	-	-	-	-	3	0
Total	169	350	396	134	169	49	105	149	111	119	161	100

Table 3. Number of successful snail kite nests by wetland, 1996 through 2007.

Regions	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
WCA 1	-	0	5	-	-	-	0	-	0	0	0	0
WCA 2A	0	0	0	0	0	0	0	0	0	0	0	0
WCA 2B	1	5	53	0	0	0	4	3	11	0	0	0
WCA 3A	35	140	84	14	33	0	24	28	19	0	11	0
WCA 3B	0	0	2	3	15	0	3	0	3	0	3	0
Tohopekaliga	4	5	0	1	2	4	12	4	0	12	5	42
E. Tohopekaliga	-	-	-	-	-	0	2	0	0	0	1	1
St. Johns Marsh	7	5	1	2	1	0	0	3	3	2	2	0
Kissimmee	0	1	1	12	0	9	3	7	4	1	0	2
Lk. Okeechobee	15	0	4	0	0	0	0	1	3	3	7	0
West Palm/ Grassy Waters	0	0	0	0	0	0	0	1	0	1	0	0
Everglades National Park	4	0	0	0	6	0	0	0	0	0	13	0
Lk. Istokpoga	-	-	-	-	-	-	-	-	-	4	0	2
Others	6	0	4	3	-	-	-	-	-	-	0	0
Total	72	156	154	35	57	13	48	47	43	23	42	47

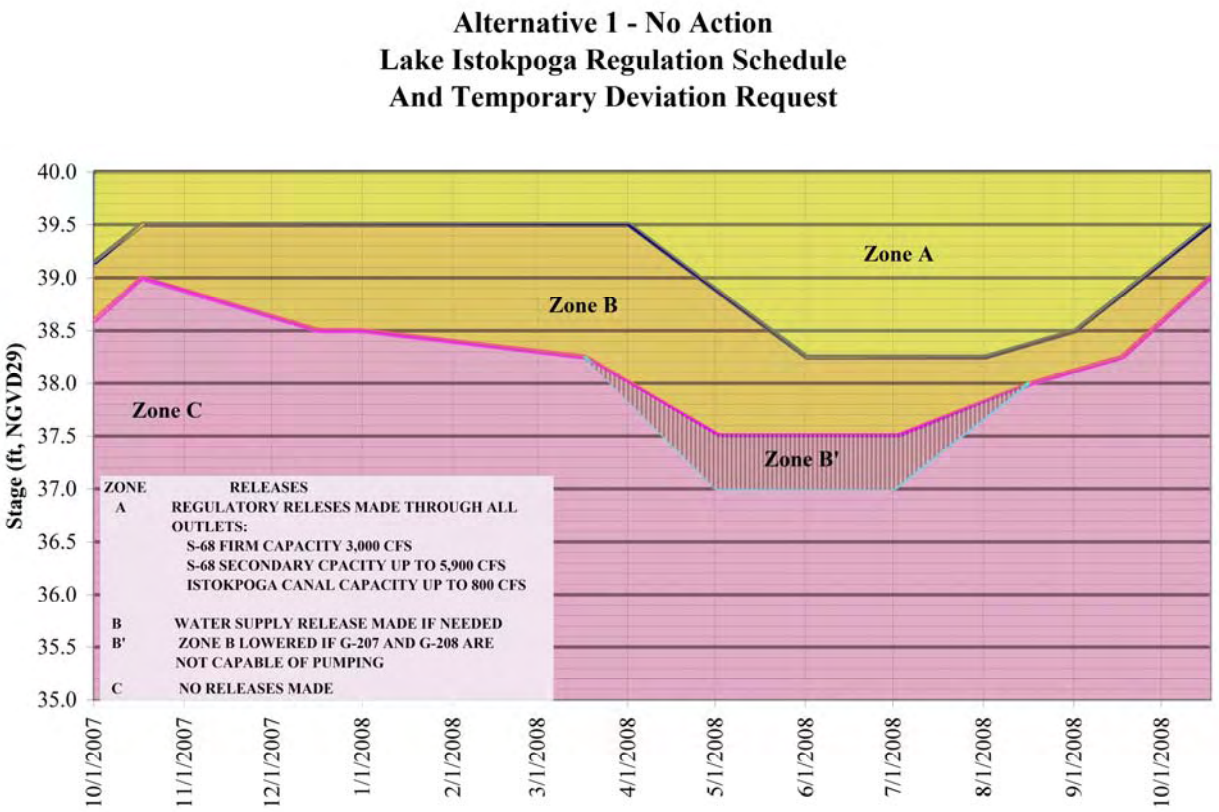


Figure 1. Lake Istokpoga regulation schedule (Corps 2007). This schedule was analyzed as Alternative 0 in the Corps' Environmental Assessment (mislabeled in this graphic as Alt-1).

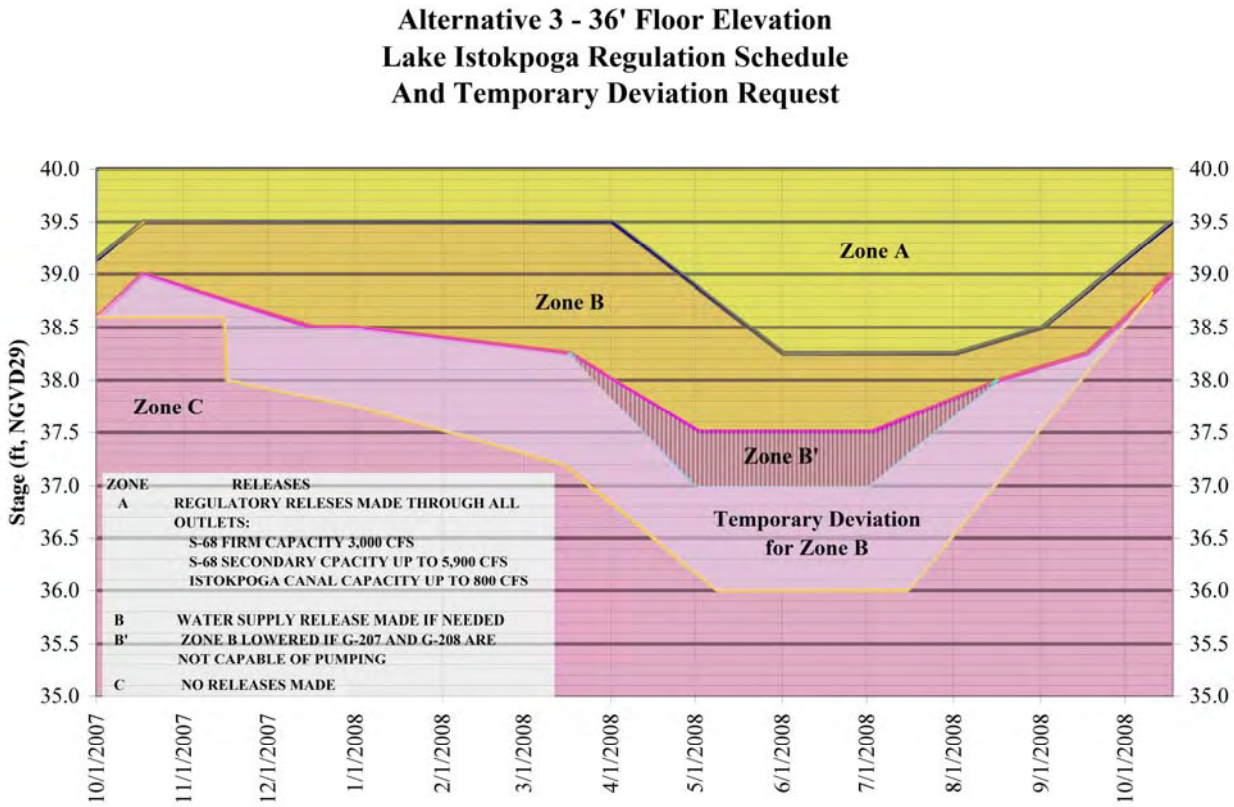


Figure 2. Proposed deviation to the Lake Istokpoga regulation schedule (Corps 2007). This deviation was analyzed as Alternative 2 in the Corps' Environmental Assessment (mislabeled in this graphic as Alt-3).

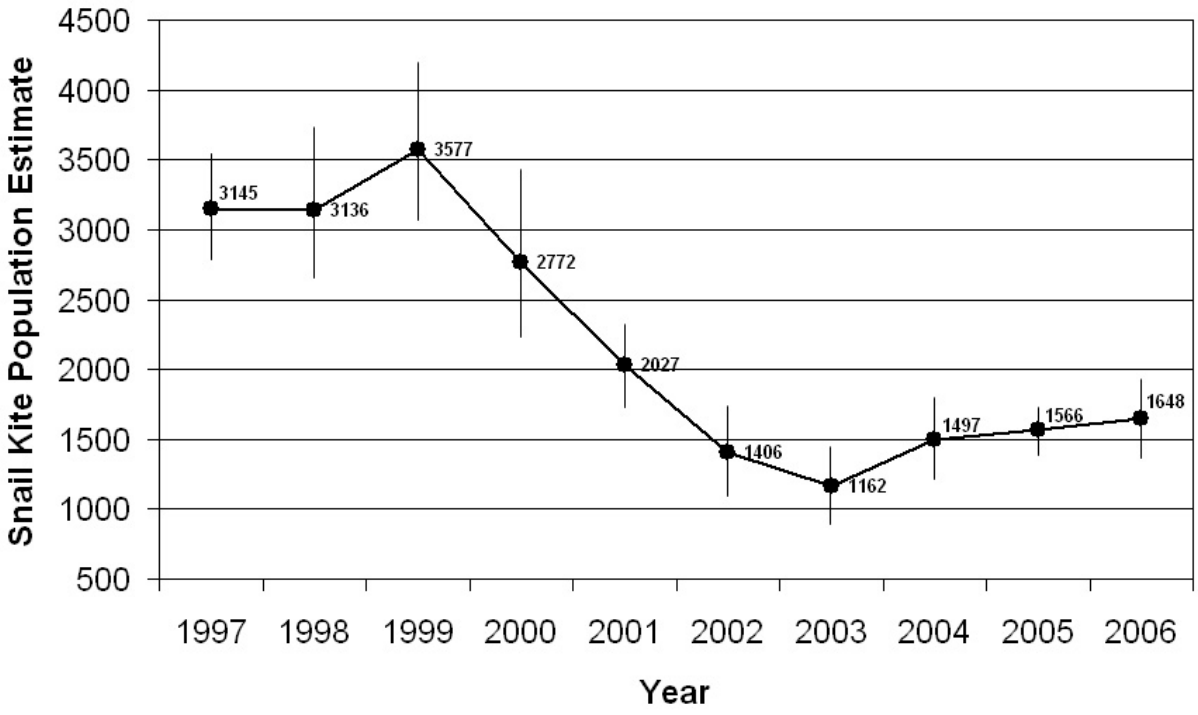


Figure 3. Estimates of state-wide snail kite population size between 1997 and 2006. Error bars correspond to 95 percent confidence intervals (Martin pers. comm. 2007).

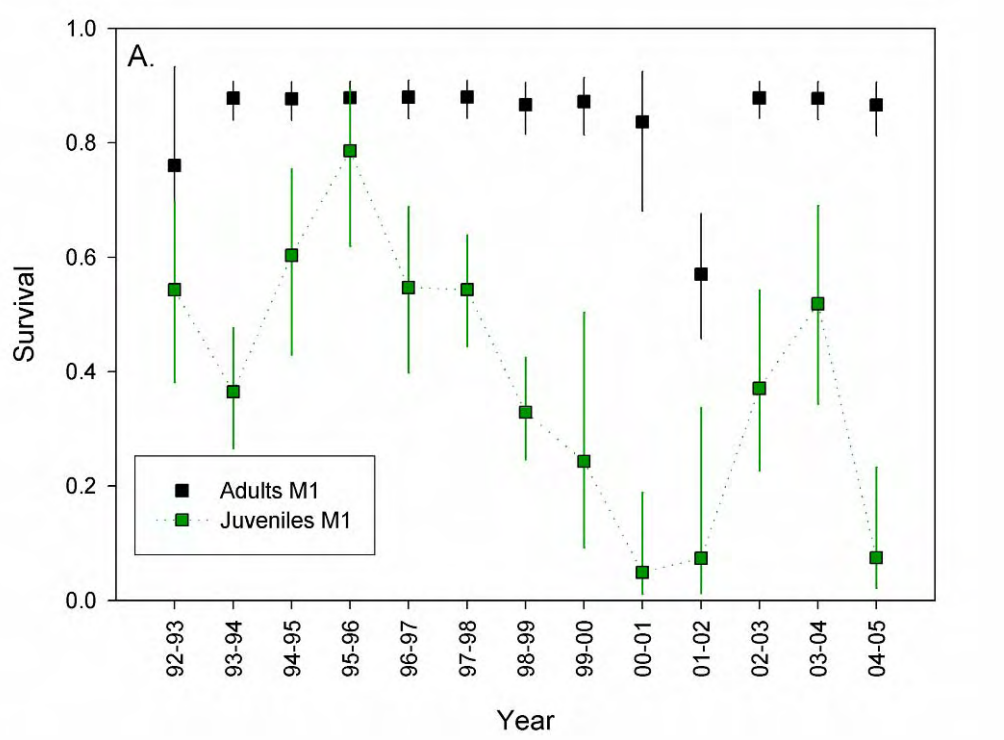


Figure 4. Model-averaged estimates of adult (black squares) and juvenile (white circles) survival (φ) between 1992 and 2005. Error bars represent 95 percent confidence intervals (from Martin et al. 2006).

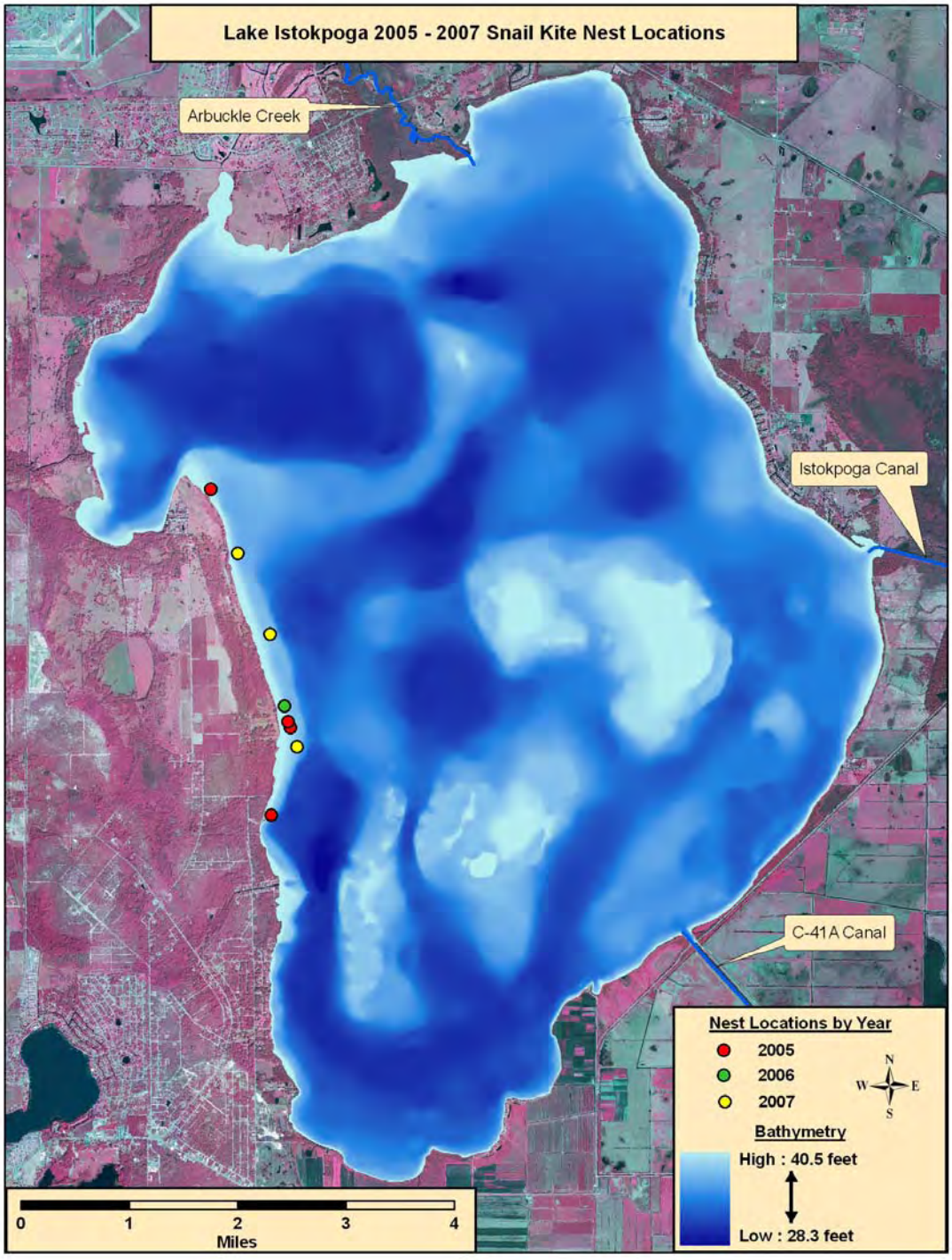


Figure 5. Snail kite nest locations on Lake Istokpoga, 2005-2007.

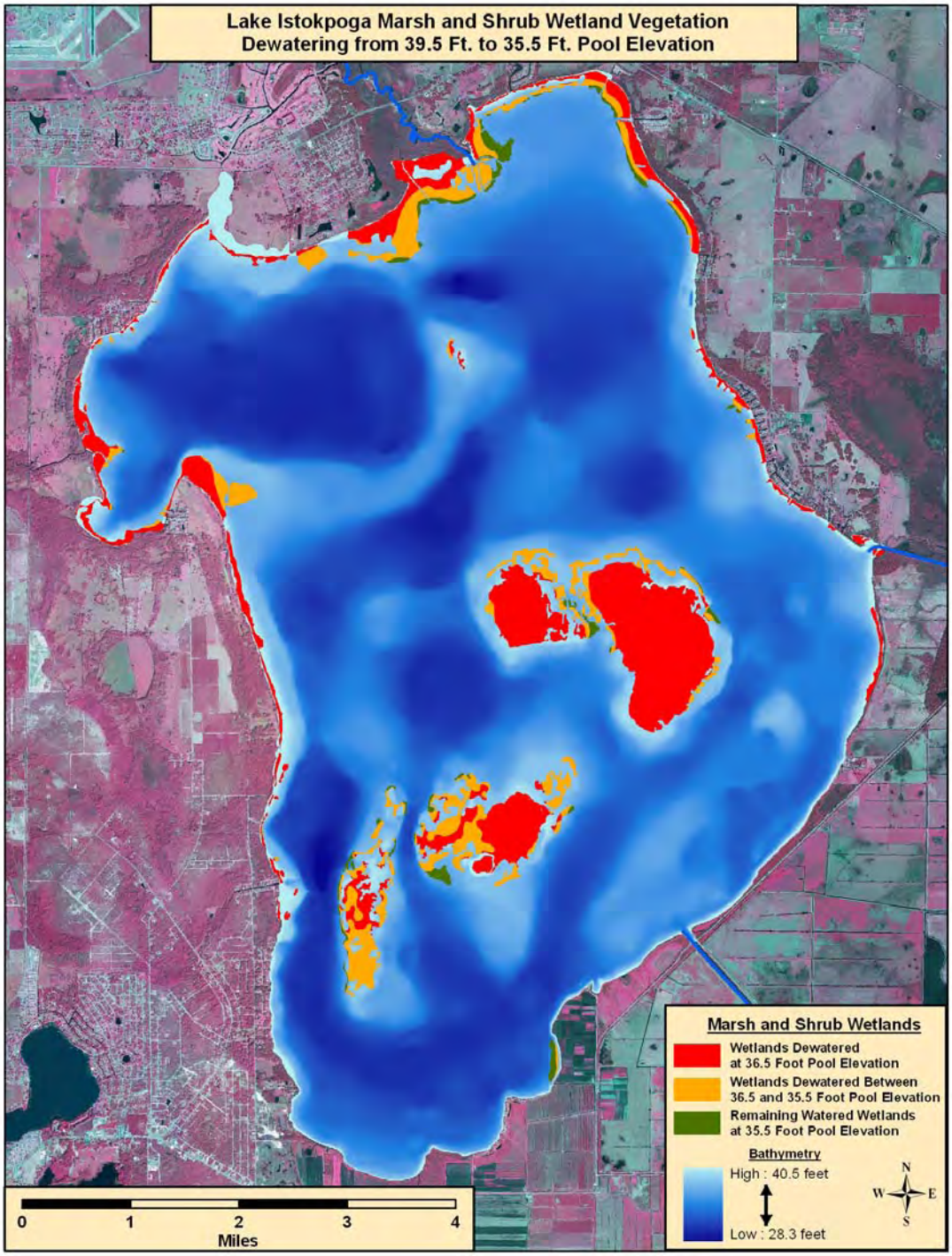


Figure 6. Extent of snail kite habitat (marsh and shrub wetland vegetation) dryout when Lake Istokpoga stage drops from 39.5 ft to 36.5 ft (no action alternative), and from 36.5 ft to 35.5 ft (proposed deviation).

Figure 7. Littoral and near-shore vegetation zones in the vicinity of recent snail kite nest activity on Lake Istokpoga. These are the areas in which the Service recommends no additional management activities in 2008.

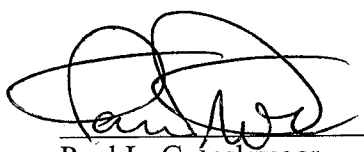
ENCLOSURE 2

PRELIMINARY FINDING OF NO SIGNIFICANT IMPACT
TEMPORARY DEVIATION TO THE REGULATION SCHEDULE
FOR LAKE ISTOKPOGA

The proposed action analyzed in this Environmental Assessment (EA) is recommendation of a temporary deviation from the approved Regulation Schedule for Lake Istokpoga to lower Zone B of the Regulation Schedule from 37.0 feet, NGVD to 36.5 feet, NGVD. I have reviewed the information analyzed in the Environmental Assessment for the proposed action, reflecting pertinent information obtained from other agencies having jurisdiction by law and/or special expertise. I conclude that there would be no significant adverse impacts caused by the proposed temporary deviations, taking into consideration the adverse effects of the severe drought itself. Summary reasons for this conclusion are that the proposed action:

a. Is a short-term temporary deviation from the established Regulation Schedule for Lake Istokpoga to aid in providing needed water supply for agricultural users in the Indian Prairie Region and the Seminole Brighton Tribe during the regional drought occurring in Florida.
b. Will not adversely affect the balance of authorized purposes of the Central and Southern Florida Project for flood control, water supply, fish and wildlife conservation, and recreation.
c. Will not permanently affect wildlife or fish or their habitats in Lake Istokpoga.
d. Has been the subject of consultation which resulted in authorization of incidental take, pursuant to the Endangered Species Act for three (3) snail kite nests on Lake Istokpoga.
e. Will be coordinated by the Interagency Water Shortage Management Team which will continue to hold conference calls and coordinate as necessary throughout the duration of this drought. Should drought conditions worsen, the Corps will reconsider the request by the South Florida Water Management District (SFWMD) to lower Zone B of the Lake Istokpoga Regulation Schedule to 35.5 ft., NGVD.

Based on the information summarized, and after consideration of public and agency comments received on the project, I find that the proposed action will not have a significant effect on the quality of human environment under the meaning of Section 102(2)(C) of the National Environmental Policy Act, and, therefore, does not require preparation of an Environmental Impact Statement.



Paul L. Grosskruger
Colonel, U.S. Army
District Commander

6 June 07
Date

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ENVIRONMENTAL ASSESSMENT

Temporary Deviation to the Regulation Schedule for Lake Istokpoga
for 2007 Drought Relief

1.0 Background

1.1 Introduction

The South Florida Water Management District (SFWMD) has requested that the U.S. Army Corps of Engineers (Corps), Jacksonville District, (Corps) implement a temporary deviation to the approved regulation schedule for Lake Istokpoga (see appendix for the March 30, 2007 request, as well as the April 19, 2007 updated request). The purpose of the deviation is to allow additional water for potential use to meet water supply demand, if needed during the current regional drought for deliveries to agricultural operations in the Indian Prairie Basin and the Seminole Indian Brighton Reservation.

The request received on April 19, 2007 included an ecological assessment with three alternatives to consider for the temporary deviation, with Alternative 2 being the preferred alternative of the SFWMD. Alternative 2 would allow Lake Istokpoga to decline to as low as 35.5 ft., National Geodetic Vertical Datum of 1929 (NGVD) while providing water supply releases.

In response to the regional drought conditions, the SFWMD Governing Board declared a water shortage (Order No. 2207-057-DAO-WS) on April 12, 2007 for portions of the Kissimmee River Valley Water Use Basin, the Entire Indian Prairie Water Use Bain, and the Lower East Coast Area and the Lake Okeechobee Service Area (for non-agricultural uses). Thirty percent cutbacks on allocations were imposed on permitted agricultural users in the southern portion of the Indian Prairie Basin and portions of the Lakeshore Perimeter Water Use Basin. More severe restrictions were subsequently put in place on May 10, 2007 when the Modified Phase III water restrictions were implemented. These orders are enclosed in the appendix.

1.2 Authority

Lake Istokpoga is part of the Central and Southern Florida Project (C&SF Project), as described in House Document 80-643, which Congress authorized as the C&SF Project in the 1954 Flood Control Act (Pub. L. No. 80-858). The purposes of the C&SF Project include flood control, water supply, recreation, and environmental restoration. Section 309 of the 1992 Water Resources Development Act which reads in part: "determining whether modifications to the existing project are advisable at the present time due to significantly changed physical, biological, demographic, or economic conditions" allows for reevaluation of the project.

Additional authority is provided in Corps Regulation, 33 CFR 222.5, Water Control Management (ER 1110-2-240). This regulation provides that the Chief of Engineers or

his designated representative may authorize or direct deviation from the established water control plan (regulation schedule) when conditions warrant such deviation.

1.3 Purpose and Need

The purpose of the deviation is to lower Zone B of the Regulation Schedule for Lake Istokpoga for potential water supply as necessary for agricultural use by the Indian Prairie Basin and the Seminole Indian Brighton Reservation. The current actions undertaken by the SFWMD under the provisions set forth by the Water Shortage Restriction Plan are not expected to be sufficient should the regional drought conditions continue. In addition to the no action alternative, three alternatives of action were evaluated.

1.4 Decisions To Be Made

The Corps, SAJ, must take no action or an alternative action (temporary deviation) and the Corps South Atlantic Division (SAD) must approve the preferred alternative, approve another alternative, or decide to maintain the existing Regulation Schedule. The Corps, SAJ can recommend any alternative or modified alternative. Even if the proposed deviation is approved, the SFWMD is under no obligation to implement it if it becomes unnecessary.

2.0 Proposed Action

Four alternatives were identified by SFWMD for evaluation, with the SFWMD preferred alternative being Alternative #2. Alternatives are outlined on the following chart:

	ALT-0	ALT-1	ALT-2	ALT-3
Lake Istokpoga Regulation Schedule	No Deviation from Current Regulation Schedule	Flexibility to lower floor to 36.5	Flexibility to lower floor to 35.5	Flexibility to lower floor to 34.5

Note: All elevations shown in this table are in feet., NGVD.

Specifically, The SFWMD is requesting a temporary deviation that will allow releases as needed for water supply when Lake Istokpoga is above 35.5 ft., NGVD. The decrease would begin when the floor level reaches 37.0 ft., NGVD.

Additional Alternatives

In addition to the above alternatives, the Corps considered incorporating the use of temporary smaller capacity pumps at the G-207 and G-208 locations. Smaller pumps would be able to access the canal and pump some water out, but cost and availability of pumps would have to be considered, as well as availability of water in this canal. Benefits of this alternative include no adverse impacts to Endangered Species (snail kites nesting on Lake Istokpoga), as well as no additional adverse economic impacts that would be caused by low water levels of Lake Istokpoga to Highlands County. SFWMD

responded that this alternative was not valid due to the need to dredge the canals in order to have adequate intake depth for safe operation of the temporary pumps.

The Corps also considered "Alt 2 modified". This alternative is a suggestion of the Highlands County Board of Commissioners and includes decreasing the length of the temporary deviation.

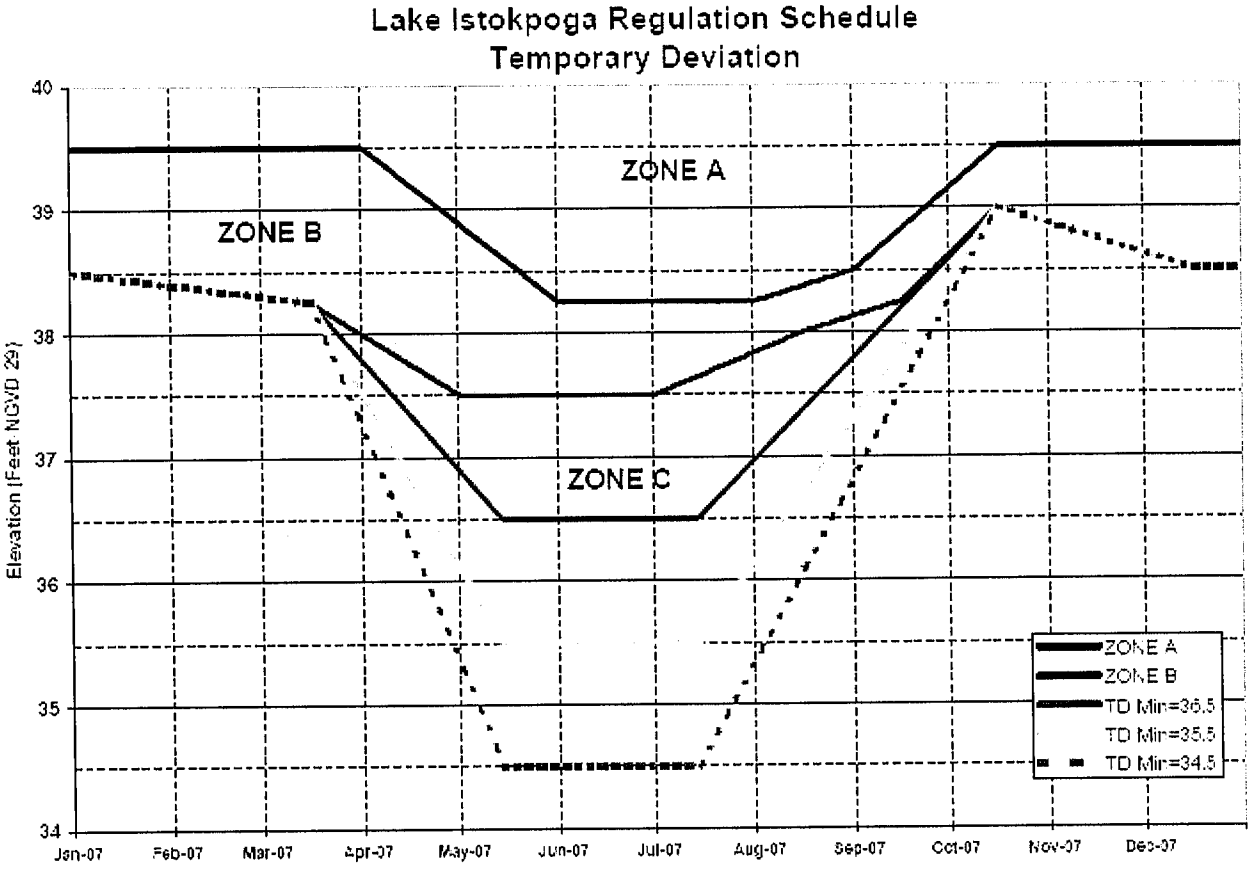

Figure 1 – Lake Istokpoga Regulation Schedule

3.0 Existing Conditions

3.1 Introduction

Lake Istokpoga is the 5th largest natural lake in Florida (11,200 hectares). It is connected to the Kissimmee River via the Istokpoga Canal and the C-41A Canal and Lake Okeechobee via the C-40 and C-41 canals (see Figure 2). The main outlet for Lake Istokpoga is S-68, which regulates discharges from the lake to C-40, C-41, and C-41A canals.

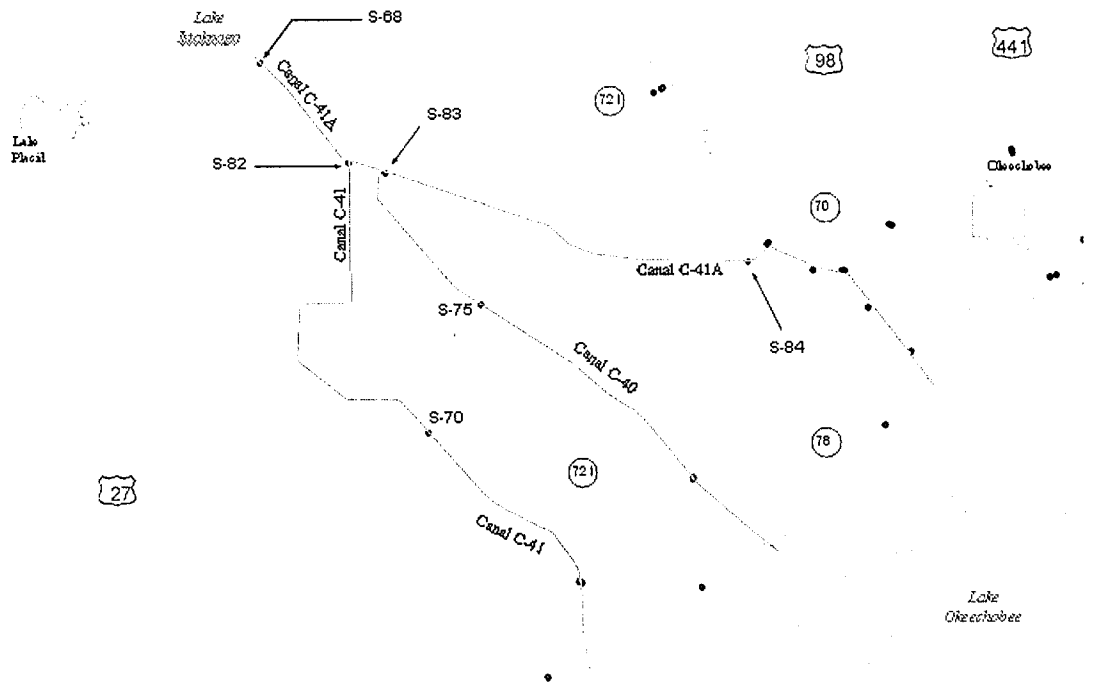

Figure 2 – Lake Istokpoga Structures and Canals

3.2 Hydrology

Lake Istokpoga receives inflow from two streams, Josephine Creek and Arbuckle Creek. Inflows have been very limited and rainfall for 2007 is well below average. Currently, Lake Istokpoga, measured at the S-68 headwater gage, is slightly above the bottom of Zone B. In Zone B, releases are authorized to a floor elevation of 37.5 ft., NGVD if G-207 and G-208 pumps are operational, and 37.0 ft., NGVD when the G-207 and G-208 pumps are inoperable, due to low Lake Okeechobee stages.

Beginning in the fall of 2006, a series of water shortage restrictions have been declared affecting users in the Indian Prairie Water Use Basin and the Lake Okeechobee Service Area. These restrictions were put in place to preserve the dwindling water supply, and as the severity of the drought has increased, so have the restrictions imposed on these users (SFWMD, 2007). Emergency Water Shortage Orders were signed April 12, 2007 implementing 30% cutbacks on allocated users. On May 10, 2007, modified Phase III Extreme Water Shortage Restrictions were placed on all users.

Water levels on Lake Istokpoga have declined below 36.5 ft., NGVD a total of 9 times since water levels have been recorded. As shown in the table below, since constructed as part of the C&SF Project, there have been 3 events at Lake Istokpoga when the lake level was below 36.5 ft., NGVD:

Drought Status	Start Date	End Date	Duration (days)	Minimum Stage (ft., NGVD)	Minimum Stage Date
Extreme	10 Feb 1962	23 Jun 1962	133	35.40	30 May 1962
Severe	23 May 1971	28 Jun 1971	36	36.20	07 Jun 1971
Severe	08 Mar 2001	07 Jul 2001	121	35.84	21 May 2001

3.2.1 Previous Temporary Deviations

A temporary deviation from the regulation schedule as proposed, to a level of 35.5 ft., NGVD, has not occurred since regulation of the lake began in 1962, and prior to regulation the lowest level recorded was 35.93 ft., NGVD, in 1956.

Temporary deviations were sought and approved for Lake Istokpoga in 2001 and 2004. The 2001 situation was a natural drought and presented the opportunity for habitat enhancement. SFWMD requested that the temporary deviation be put in place to maintain low water levels so that tussock removal/littoral zone improvements could be completed (the approved temporary deviation was to 36.5 ft., NGVD, and lake levels continued to decline due to extreme dry weather and ET to a level of 35.88 ft., NGVD). In 2004, a temporary deviation was sought and approved to 36.5 ft., NGVD for the purpose of hydrilla treatment. For both events, there were no known snail kites nesting on Lake Istokpoga, and the FWS concurred with the Corps determination that the proposed project was not likely to adversely affect the endangered snail kite (USFWS, May 2007).

3.3 Environmental

3.3.1 General

Lake Istokpoga undergoes regular hydrilla treatments funded by Florida Department of Environmental Protection (DEP) and Highlands County. Large scale hydrilla treatments were used to control this submersed exotic plant that has covered from 70 to 94% of the lake. Herbicide treatment (endothall) occurred in April 2007, and currently hydrilla covers a relatively small portion of the lake.

Lake Istokpoga provides habitat for a variety of fish, wading birds, and wildlife, including one of the largest osprey nest concentrations in the world. Lake Istokpoga has two islands (Bumblebee Island and Big Island) which, combined with their surrounding marsh, provide significant wading bird rookery habitat for several thousand nesting pairs of birds (Audubon, 2005).

Lake Istokpoga has been designated a Fish Management Area by the Florida Fish and Wildlife Conservation Commission, and supports an estimated $6 million dollar fishery

(Beacham & Furse, 2002). The lake has at least four (4) species of fish of significance to fisherman: black crappie (*Pomoxis nigromaculatus*), redear sunfish (*Lepomis microlophus*), bluegill (*Lepomis macrochirus*), and largemouth bass (*Micropterus salmoides*). The renowned largemouth bass fishery is considered to be one of the finest in the state (Stout, 2002).

3.3.2 Endangered Species

Federally listed species that may occur in or around Lake Istokpoga include the Everglade snail kite, wood stork, Audubon's crested caracara and bald eagle. In relation to the temporary deviation however, potential impacts would only affect the snail kite. Lake Istokpoga is used as foraging and reproductive habitat for the snail kite. Snail kites nest through spring and early summer, and nests could be adversely impacted by the lowering of water levels.

Florida apple snails are the primary food source for the snail kite and abundance of this food source affects nesting success of snail kites. Phil Darby is attempting to collect information on Lake Istokpoga for estimates of apple snail density on Lake Istokpoga (FWS, 2007). Apples snails can not tolerate extended periods of dessication and extended periods of low water levels (whether drought induced or temporary deviations) can have severe impacts on apple snail populations.

Weekly updates are being provided regarding the snail kite nesting success in Lake Istokpoga (as well as other locations in southern and central Florida), and currently there are three active snail kite nests on Lake Istokpoga.

Consultation was initiated with the U.S. Fish and Wildlife Service on April 25, 2007, for the Everglade snail kite. The Corps coordinated a "may affect" determination and requested a take statement for the 3 nests that could be affected if Lake Istokpoga water levels were lowered. Coordination was concluded on May 21, 2007. USFWS provided a Biological Opinion including an incidental take statement with the requirement that artificial nest supports be implemented on these nests prior to lowering of the water levels.

3.4 Socio-Economics

Lake Istokpoga is used for recreational boating, fishing, and waterfowl hunting. The lake is also an important source of water supply for downstream agriculture and the Brighton Seminole Reservation. Deviations from the current regulation schedule have the potential to impact all of the existing users and resources.

3.4.1 Demographics

3.4.1.1 Population

The 2000 Census block group data for the Lake Okeechobee Watershed within Glades and Highland Counties shows a total population of approximately 18,900 people. 10,748

of this population resides in Highlands County and the remaining 8,131 live in Glades County.

The growth rate between 1990 and 2000 for the two counties located within the project watershed, Glades and Highlands is similar to the State of Florida's growth rate over this period of 23.5 percent. Highlands County's growth rate for this period was 27.7 percent; however according to the 2000 Census, 100 percent of this growth was from net migration. The growth rate for Glades County over this time period was slightly higher than Highlands and the state at 39.3 percent. As with Highlands County, the 2000 Census indicated that 100 percent of this growth was from net migration.

The population densities for Highlands and Glades Counties are 85 people per square mile and 14 people per square mile, respectively. Although Highlands County has the most dense population for the County's land area, there are no densely populated areas located in the part of Highlands County within the study area.

3.4.1.2 Income

Since 1990, total personal income (by place of residence) in the three county area of Highlands, Glades and Okeechobee has risen from about $1.64 billion dollars to $2.59 billion in 1999. During this period, income increased at an annual rate of about 4.6 percent per year. Of the total personal income in the three county area (Highlands, Glades & Okeechobee), 69.2 percent occurred in Highlands County, 24.4 percent occurred in Okeechobee County and the remaining 6.4 percent in Glades County. Within the 3 county area total earnings in 1999 are estimated at about $1.20 billion dollars. Of this amount $780.0 million dollars were derived from wages and salaries, $103.3 million dollars from "other labor" and $312.5 million dollars from proprietors income. Of proprietors Income, $178.1 million dollars was farm income and the remaining $134.4 million dollars non-farm income. Total earnings ranged from a low of $59.0 million dollars in Glades County to a high of $797.5 million dollars in Highlands County. Total earnings in Okeechobee County were $338.9 million dollars.

It is estimated that the 1999 per capita Income in the two county study area ranged from $18,905 in Glades County to $23,734 in Highlands County. At the same time per capita Income for the State of Florida and the United States was estimated at $27,781 and $28,546, respectively.

In 2000, agriculture and fishing was the third leading employer in Glades County, with 244 persons employed in the agricultural sector. 3,643 persons were employed by the agricultural/fishing/forestry sector in Highlands County, the third largest employer in the county as well.

3.4.2 Water Supply

3.4.2.1 Northern Glades County

Major surface water features in this part of the county include Lake Okeechobee, Fisheating Creek, Nicodemus Slough, Indian Prairie Canal (C-40), Harney Pond Canal (C-41), and the Kissimmee River. Rainfall driven systems without a large storage capacity are used as sources of water to a lesser extent. Three aquifer systems are present in the northern portion of Glades County: SAS, IAS, and the FAS. Of the three, only the FAS serves as an important source to meet water demand

The entire Glades County is rural and sparsely populated (only two other counties in Florida, Lafayette and Liberty, have fewer residents). Northern Glades is predominantly agricultural and there has been a steady increase in acreage of irrigated crops, which are mostly planted on land that was formerly used for nonirrigated pasture.

Total average demand for water is expected to grow by 52 percent from 9,576 mgy in 1995 to 14,562 mgy in 2020 and agricultural demand is anticipated to make up almost 98 percent of the total demand over the projected period.

Domestic Self-Supply and Small PWS - The entire population of Northern Glades County is self-supplied and is projected to grow from 3,289 in 1995 to 5,640 by 2020. Domestic self-supplied demand was assessed to be 0.42 mgd (153 mgy) in 1995 and, based on the projected self-supplied population, average demands are forecasted to rise to 0.76 mgd (277 mgy) by 2020. The 1-in-10 demands in 2020 are equal to 0.81 mgd (mgy). Overall, urban demand is projected to remain low for this part of Glades County.

Agricultural Self-Supply – Irrigated commercially grown corps in northern Glades County include citrus, sugarcane, vegetables and sod. Improved pasture is generally not irrigated but there is some demand for cattle watering. Agricultural irrigation demand is in 1995 was assessed at 9,423 mgy and is forecasted to increase to 14,285 by 2020, a 52% increase.

Miscellaneous – SFWMD land use maps from 1995 indicate that two thirds of the cattle in Glades County were in the northern portion. 1995 demand for cattle watering was 222 mgy and is projected to decline to 214 mgy by 2020 as non-dairy ranches are converted to agricultural production.

3.4.2.2 Eastern Highlands County

This is the only portion of the county that falls within the jurisdiction of the SFWMD. Surface water resources in this part of the county include a variety of small lakes that fall within the Lake Istokpoga/Arbuckle Creek drainage basin and which discharge through C-41A and Lake Istokpoga canals to the Kissimmee River and ultimately to Lake Okeechobee. In addition to the many lakes, several small rivers and creeks form an important component of the surface water system.

The groundwater system includes all three major aquifers, FAS, IAS, and SAS. Of the three, the FAS is the single most important source of water. There are no major public water supply utilities in eastern Highlands County and all residents are self supplied. Total demand is projected to grow by 71 percent from 34,157 mgy in 1995 to 58,522 mgy in 2020. Demand for agricultural irrigation makes up 96 percent of the total projected demand. Urban demand, although increasing by 55 percent, still only makes up a minor portion of total demand through 2020 .

Domestic Self-Supply - All residents in eastern Highlands County are either self supplied or receive water from very small utilities. Domestic self-supplied demand is projected to grow from 0.81 mgd (296 mgy) in 1995 to 1.28 mgd (467 mgy) in 2020. 1-in-10 demand projected for 2020 is 1.35 mgd (493 mgy).

Recreational Self-Supply – This category includes self-supplied irrigation demands for large landscaped areas (as opposed to private homes) and for golf courses. Self-supplied large landscaped area is projected to increase from 989 acres in 1995 to 1,524 acres in 2020. Landscaping self-supplied average demand for this portion of the county (not including golf courses) is projected to increase from 1,203 mgy in 1995 to 1,853 mgy by 2020. The 1-in10 irrigation requirements in 2020 are 2,159 mgy. There are no golf courses in this part of the county.

Agricultural Self-Supply – Irrigated commercially grown crops in eastern Highlands County are citrus, vegetables, blueberries, sod and greenhouse/nursery operations. Improved pastures are usually not irrigated but there is some demand for cattle watering.

Miscellaneous – In 1995, demand for cattle watering was assessed at 827 mgy and is projected to decline to 766 mgy by 2020 as some land formerly used for pasture is used for irrigated crops. Demand for aquaculture was assessed at 97 mgy in 1995 and is projected to remain unchanged through 2020.

3.4.3 Existing Agriculture

Distribution of Agricultural Crops.
At the time of this writing current data on agricultural production within the counties located in the watershed were not available. The data presented was obtained from "Florida Agricultural Facts", the 1999 edition that contains 1997 and 1998 production and dollar values. The watershed and the counties within the watershed can be characterized as rural. About 76.5 percent of the total land within the counties is classified as farmland. The number of farms in 1998 in the three county area ranged from 189 farms in Glades County to 779 farms in Highlands County.

Cropland Acreage
Within the three county area it is estimated that in 1998 there was about 235,782 acres of land designated as cropland. In any given year, not all cropland is in production. The primary crops within the area are, citrus, sugarcane, caladiums and sod. Cropland devoted to citrus production accounted for about 42.0 percent of total cropland in 1998. Of the 98,929 acres of citrus cropland 75,909 acres was located in Highlands County.

Highlands County was ranked 2nd in the State in terms of total citrus production. Caladiums are also grown in the upland areas of Highlands County. In recent years there appears to be an effort to covert pastureland to citrus, sugarcane and sod production. In Glades County, about 72.0 percent of the cropland is devoted to sugarcane and citrus. Sugarcane alone accounts for 45.9 percent of cropland acreage. As with Highlands County, more and more pastureland is being converted to the production of sugarcane and sod.

In 1998, receipts from crop production within the three county area was $228.3 million dollars. Of this amount, $126.9 or 55.6 percent was derived from the production of citrus. Highlands County accounted for $105.1 million dollars of total citrus receipts. In Glades County total crop receipts were $37.9 million dollars. Of this amount, $25.1 million dollars were from the production of sugarcane ($14.3 million dollars) and citrus ($10.8 million dollars).

3.4.4 Existing Recreation

Around the Lake Istokpoga area, a number of recreational opportunities exist including biking, hiking, hunting, fishing (fish camps and tournament fishing), boating, camping, swimming, picnicking, horseback riding and wildlife observation.

Lake Istokpoga ranks as one of Florida's top bass fishing destinations, with an annual fisheries income of six million dollars (Beacham & Furse, 2002). While Lake Istokpoga has the highest Largemouth Bass rates in Florida, quality Black Crappie fishing is present as well (Florida Fish and Wildlife Conservation). There are six different fish camps/resorts on the lake and numerous public access points to accommodate recreational fishing demand.

4.0 Effects

4.1 General

The drought itself has already caused adverse effects on natural plant communities, fish and wildlife all over Florida. Implementation of the temporary deviation from the Regulation schedule is anticipated to intensify the adverse effects of the drought. The severity of the temporary deviation implementation effects will depend not only on how low the water levels get, but their duration prior to summer rains. This Environmental Assessment was prepared in mid-May, 2007, with the expected onset of rains only a few weeks away; therefore, the duration of temporary deviation effects (over and above the adverse effects of the drought itself) is expected to be short. Adverse effects would depend largely on the acceleration of the recession rate caused by additional water withdrawals (over and above evaporation and seepage losses).

4.2 Hydrology

Currently, Lake Istokpoga is at 37.6 ft., NGVD (May 23, 2007). This level is significantly below average for this time of year, and is expected to drop further. At the

same time the evapotranspiration rate is high due to increasing day length and air temperature.

Figure 3 is a chart provided on May 7, 2007 by SFWMD projecting water levels on Lake Istokpoga with no rainfall and 30% cutbacks in place.

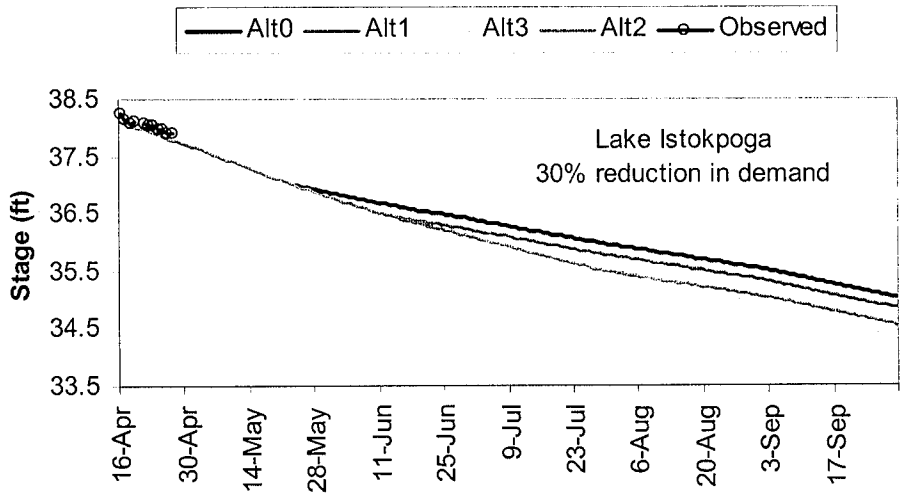

Figure 3 – Projected Lake Istokpoga Levels

Due to some rainfall in the basin, the actual elevation of Lake Istokpoga on May 18, 2007 is 0.5 feet above the projected values on figure 3. Considering the 0.5 foot difference in lake elevation, implementation of Alternative 1 (lowering the floor to 36.5 feet NGVD), would provide water supply for downstream users until June 23, 2007. Implementing Alternative 2 (35.5 ft., NGVD would provide 56 additional days of relief, and would be reached on August 17, 2007 (based on SFWMD's position analysis). Implementation of Alternative 3 would provide water supply well into October. These dates are projected with no rainfall.

4.3 Environmental Effects

4.3.1 General

Lake Istokpoga water levels are already decreasing as a result of the drought. Lower water levels increase the area in which seeds of emergent plants can germinate (SFWMD, 2007). Lower water levels also allow more light to reach the bottom of the lake, which promotes the growth of native submergent vegetation such as Illinois pondweed (*Potamogeton illinoesis*) and eelgrass (*Vallisneria americana*). Following the 2001 drawdown, the coverage of Illinois pondweed and eelgrass increased to several hundred acres north of Bumblebee Islands and Big Island. Alternative 1 has the same minimum water elevation of the deviation in 2001, and would likely elicit a similar increase of submerged vegetation. Alternatives 2 and 3 would likely not result in the same response as Alternative 1 because the areas would be dried out where the response was observed in 2001. Implementation of Alternatives 2 and 3 may stimulate growth of submersed vegetation in other parts of the lake where seed sources are available.

Because Lake Istokpoga is consistently treated for hydrilla, this is a concern of the drawdown. Currently hydrilla coverage on the lake is low, but artificial drawdowns significantly increase sprouting rates of tubers at a rate of 75-95% after the site is inundated (Haller et al, 1976). Because there are limited options for hydrilla treatment, the potential for stimulating growth is a serious risk of exposing large areas of tubers. Alternative 1 exposes 12% of the lake area, Alternative 2 exposes 20%, and Alternative 3 exposes 30% of shallow lake areas and littoral zone.

After the drought ends and water levels return to within schedule there will be residual impacts to wildlife and habitats. In areas where there are few or no refugia, or where conditions become extremely dry, entire aquatic fauna populations may be lost. Small fish such as mosquitofish may recover within one year, while others may take 3-5 years or longer. The result is lower productivity (food for higher trophic levels) and potentially impacted recreational fisheries. Lower productivity can also affect wading birds in future years.

4.3.2 Endangered Species Effects

Although there are four Federally listed species located within the project area (Everglade snail kite, wood stork, Audubon's crested caracara and bald eagle), impacts as a result of the temporary deviation would be limited to the snail kite.

Recent surveys have shown 13 snail kites on Lake Istokpoga and currently there are three active nests on the littoral zone of Lake Istokpoga. Snail kites nest over water, in shrubs & trees or in marsh vegetation less than 2 meters in height (typically spike rush (*Eleocharis cellulose*), maidencane (*Panicum hemitomon*), sawgrass (*Cladium jamaicense*), bulrush (*Scirpus* spp.), and/or cattails (*Typha* spp.). During drought years or when the water levels decrease, these types of herbaceous vegetation lose their structure and could cause the nest to collapse. Lowering the water level significantly beneath the nest can also leave the nest vulnerable to predators. When water levels drop, the number of apple snails near the nest may also be reduced by drying, forcing the adult to fly further to feed the chicks and leaving the juvenile kites with less food base nearby.

Of the three nests on Lake Istokpoga, one is in a tree, and two are in emergent vegetation. The two nests in the littoral zone would likely collapse due to the lowered water levels if the deviation was approved, resulting in death of eggs or nestlings.

Other effects on the snail kite would be secondary impacts as a result of impacts to their food base (apple snails). The rapidly recessing water levels coincide with breeding season of the apple snail (April-June) and could result in decrease numbers of apple snails this year. Apple snails generally only live 12-18 months, and a reduction in this years breeding would significantly impact apple snail abundance next year.

Formal Consultation on the snail kite was completed on May 21, 2007, and an incidental take statement was authorized for take of up to six eggs, nestlings, or juveniles and

temporary harassment for up to four adult kites that are currently nesting. No mortality of adult kites is anticipated and artificial nest supports are required for the existing nests on the lake as an attempt to prevent collapsing. The Biological Opinon is included in the appendix of this report.

4.4 Economic Effects

Because there is no regional water supply model that covers the Lake Istokpoga Deviation Schedule study boundaries, it is impossible to ascertain quantifiably the extent of economic impacts that a lowering of the lake levels would have on agriculture, municipal & industrial water supply, or the recreation economy in the region.

For the purposes of this study, it is assumed that respective benefits & impacts caused by any deviation from the current regulation schedule for Lake Istokpoga will have an inverse relationship between water supply and recreation. In other words, lowering of the lake to maintain current releases to water supply could potentially impact recreational use on Lake Istokpoga and all the associated ancillary economic activities. Conversely, maintaining current lake level could impact municipal & industrial water supply, and agricultural yields due to a reduction in water deliveries to the regional users.

Available data was requested and gathered pertaining to recreation and fish tournaments to perform this analysis. The loss of local sales from one or more fishing tournaments that would occur if the deviation was approved to 35.5 ft., NGVD is estimated to be around $50,000. The losses from a smaller reduction in water levels would be less. That there would be cumulative impacts that extend into the next season is possible. Whether these losses would be largely drought induced or related to the temporary deviation would also be difficult to assess.

The Florida Department of Agriculture and Consumer Services (FDACS, 2007) estimates total monthly economic losses in the range from $5.2 to $7.8 million if a temporary deviation to the regulation for Lake Istokpoga is not approved and water supply deliveries are halted. Loss in agricultural receipts is estimated to range from $2.2 to $3.3 million per month. In addition to these direct losses, indirect and induced economic effects will result in $3.0 to $4.5 million per month in related economic losses. Included in these indirect and induced economic impacts are the loss of 75 to 100 jobs per month and associated tax revenue losses of $200-275,000 per month.

5.0 Public Coordination & Scoping

Staff from the Corps attended a Highlands County Commissioners meeting on May 1, 2007 and a presentation was given by John Zediak, Chief of the Water Management Section (SAJ), which outlined the details of the temporary deviation request received by the SFWMD. Catherine Byrd of the Planning Division (SAJ) attended the meeting and recorded the following notes:

Several members of the public as well as County Commissioners voiced concerns about the temporary deviation request and generally opposed the request. County commissioners requested that an economic analysis of the effects of the temporary deviation be included in the environmental assessment. The following is a list of specific concerns voiced at the meeting (several members duplicated concerns):

a. Don Bates was concerned that if the temporary deviation was approved, Lake Istokpoga would be dry at the end of the rainy season (through September), resulting in low lake levels for the following year. He said this should be considered, economic impacts that would occur to those who depended on the lake for their livelihoods would lose up to 25% of their income.
b. Bill Dwinnell, Friends of Istokpoga was concerned that hydrilla will bloom and expand during the drawdown. Also stated that he had received conflicting information from the Corps and the SFWMD. Stated that a drawdown of this magnitude would potentially kill Lake Istokpoga beyond recovery.
c. Gary Albion, Trails End Fish Resort Owner, stated that he works on the tourist development council and that significant number of businesses would suffer economically as a result of this temporary deviation. 25% of income is generated during this time, and cutting off the lake from boat access would result in loss of business on the lake. Although commercial fishing would be impacted, it is not the only type of business that would be negatively impacted.
d. Steve Foray stated that this action could result in a taking to property owners around the lake. Property owners should be allowed to have their tax levels reassessed and lowered when lake front access is impacted due to the temporary deviation. Was well drilling considered as an alternative?
e. Dave Douglass, SOS Florida Lakes, concerned that bringing the lake down to 35.5 could have serious impacts that would result in long-term problems for Lake Istokpoga. Requested that a deviation to 36.5 be considered as the preferred alternative. Stated that effects of the chemicals in the lake that are being used to treat the hydrilla be assessed in relation to the reduced water in the lake.
f. Kirt Galby, concerned that hydrilla could overtake the whole lake if it is lowered to 35.5 ft., NGVD.
g. Cliff McCormick, says business on the lake is already being impacted due to rumors about the deviation.
h. The Commissioners stop public comments due to time constraints, and asked the SFWMD to address whether well digging has been considered as an alternative. Benita Whalen provides a response to this comment (yes it is an option if a land owner applies for a consumptive-use permit, but the district is not digging wells in response to the drought).

The commissioners state that they appreciate the Corps coming down to provide information and also ask that an economic analysis of this action be included in the

Environmental Assessment. In addition to the above concerns, the following received in response to the scoping letter that was sent out on April 24, 2007 requesting comments on the proposed deviation:

i. Comment letters from property owners expressing concern about property values and inaccessibility to the lake due to low water levels and docks out of water.
j. SOS Lakes expresses concern about lowering Lake Istokpoga less than 36.5 ft., NGVD due to possible fish kills and also loss of property values.
k. Bert Galloway, Friends of Istokpoga Lake Association lists the following concerns: hydrilla, bird rookeries on Big and Bumblebee Island, bass fishing impacts, and economic impacts to lake residents.

6.0 The Recommended Action

The Jacksonville District, U.S. Army Corps of Engineers has considered the temporary deviation request received from the South Florida Water Management District on March 30, 2007, supported and modified by a letter dated April 19, 2007. The Corps recommends approval of a modification of Alternative 1 for Lake Istokpoga (36.5 ft., NGVD). The recommended temporary deviation to the Lake Istokpoga Regulation Schedule includes the lowering of Zone B from 37.0 to 36.5 ft, NGVD through 31 July 2007. The recommended temporary deviation will end on 1 October 2007 as shown in Figure 4. If the regional drought continues, the Corps would re-evaluate the need for a more extreme deviation as the need arises. The Corps recommends that water conservation measures be continued for the duration of the temporary deviation and drought emergency.

Reasons for recommending the modified Alternative 1 include the fact that we are currently in the end of the dry season and meteorologists predict ongoing dry conditions, and an active hurricane season in the wet season of 2007. The Corps believes that the additional water that would be supplied under Alternatives 2 or 3 temporary deviations, would probably inflict more adverse effects on plant communities, and habitat and forage species for wildlife, including listed endangered species in Lake Istokpoga. Approving a deviation to 35.5 ft., NGVD would set a precedent and ecological impacts that could result are unknown. A temporary deviation of this magnitude is likely to result in a lake level of significantly less than 35.5 ft., NGVD due to evaporation and transpiration if drought conditions continue.

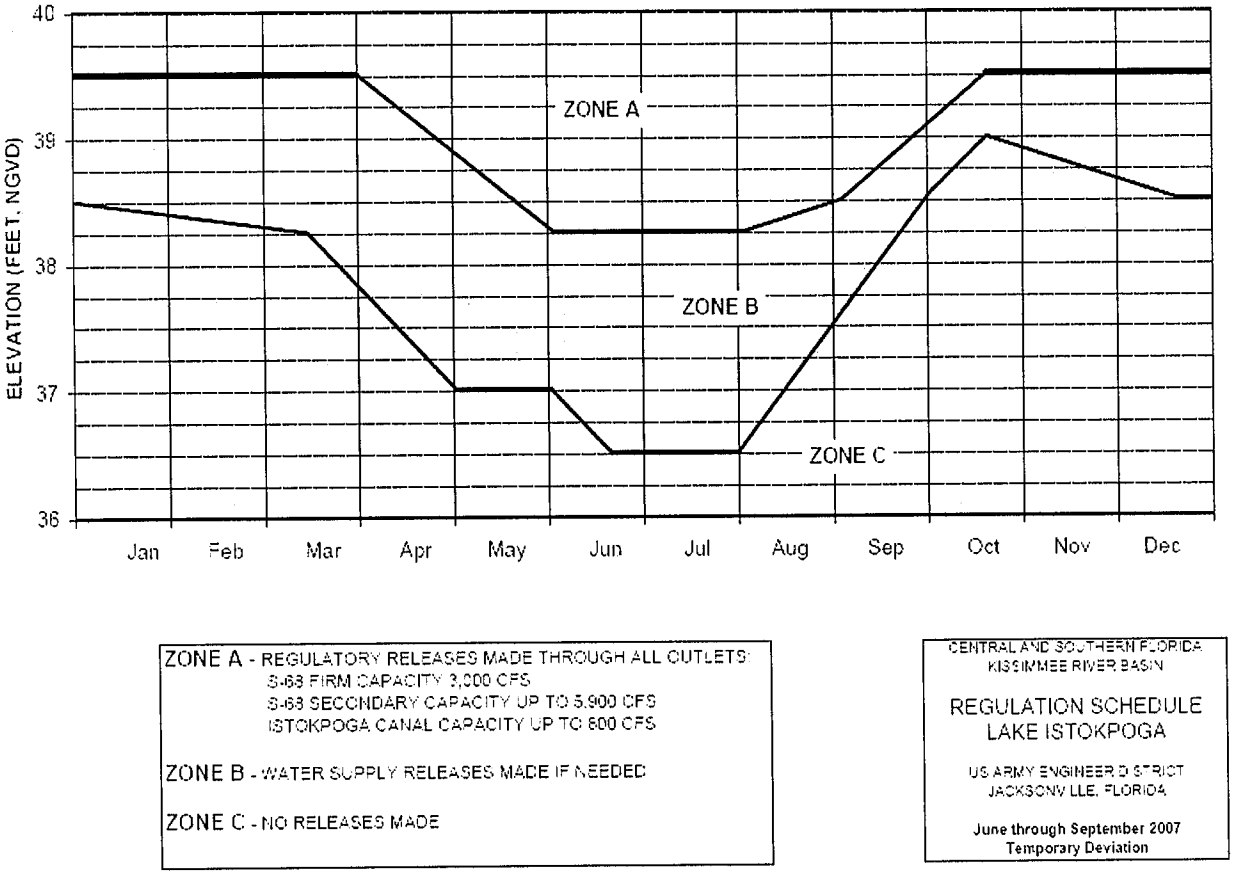

Figure 4 – Regulation Schedule for Recommended Alternative

7.0 Compliance of the Proposed Action with Environmental Law, Regulations and Policies

This Environmental Assessment was prepared by Catherine Byrd, Biologist, Planning Division, with assistance from the following individuals:

Luis Alejandro	Hydraulic Engineer	USACE
David Anderson	Sr. Environmental Scientist	SFWMD
Barbara Cintron	Chief, South Florida Section	USACE
Trent Ferguson	Hydraulic Engineer	USACE
Chris Graham	Economist	USACE
Tom Kosier	Chief Environmental Scientist	SFWMD
Kim O'Dell	Sr. Environmental Scientist	SFWMD
John Zediak	Chief, Water Management Section	USACE

7.1 National Environmental Policy Act of 1969, as amended. Environmental information on the project has been compiled and an Environmental Assessment, dated May 2007, has been prepared. The project is in compliance with the National Environmental Policy Act.

7.2 Endangered Species Act of 1973, as amended. Endangered Species Consultation with USFWS was completed for the snail kite. Consultation was initiated on May 4, 2007 and completed on May 21, 2007. This project is in full compliance with the Act.

7.3 Fish and Wildlife Coordination Act of 1958, as amended. There are no structural changes for this temporary deviation. This project is in full compliance with this Act.

7.4 National Historic Preservation Act of 1966, (PL 89-665), the Archeological and Historic Preservation Act (PL 93-291), and Executive Order 11593. Temporary water deviation will have no effect on historical resources, therefore this action is in compliance with this act.

7.5 Clean Water Act of 1972, as amended. There are no structural changes or diversion of water as part of this temporary deviation. This project is in full compliance with this act.

7.6 Coastal Zone Management Act of 1972, as amended. State consistency review was performed during the scoping phase of this project and the State has determined that the project is consistent with the Florida Coastal Zone Management Program.

7.7 Farmland Protection Policy Act of 1981. No prime or unique farmland would be impacted by implementation of this project. This act is not applicable.

7.8 Marine Mammal Protection Act of 1972, as amended. Marine mammals would not be affected by this action, therefore, this Act is not applicable.

7.9 E.O. 11990, Protection of Wetlands. No wetlands would be permanently impacted by this action. This project is in compliance with the goals of this Executive Order.

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